



Scanning - Shortwave - Ham Radio - Equipment
Internet Streaming - Computers - Antique Radio

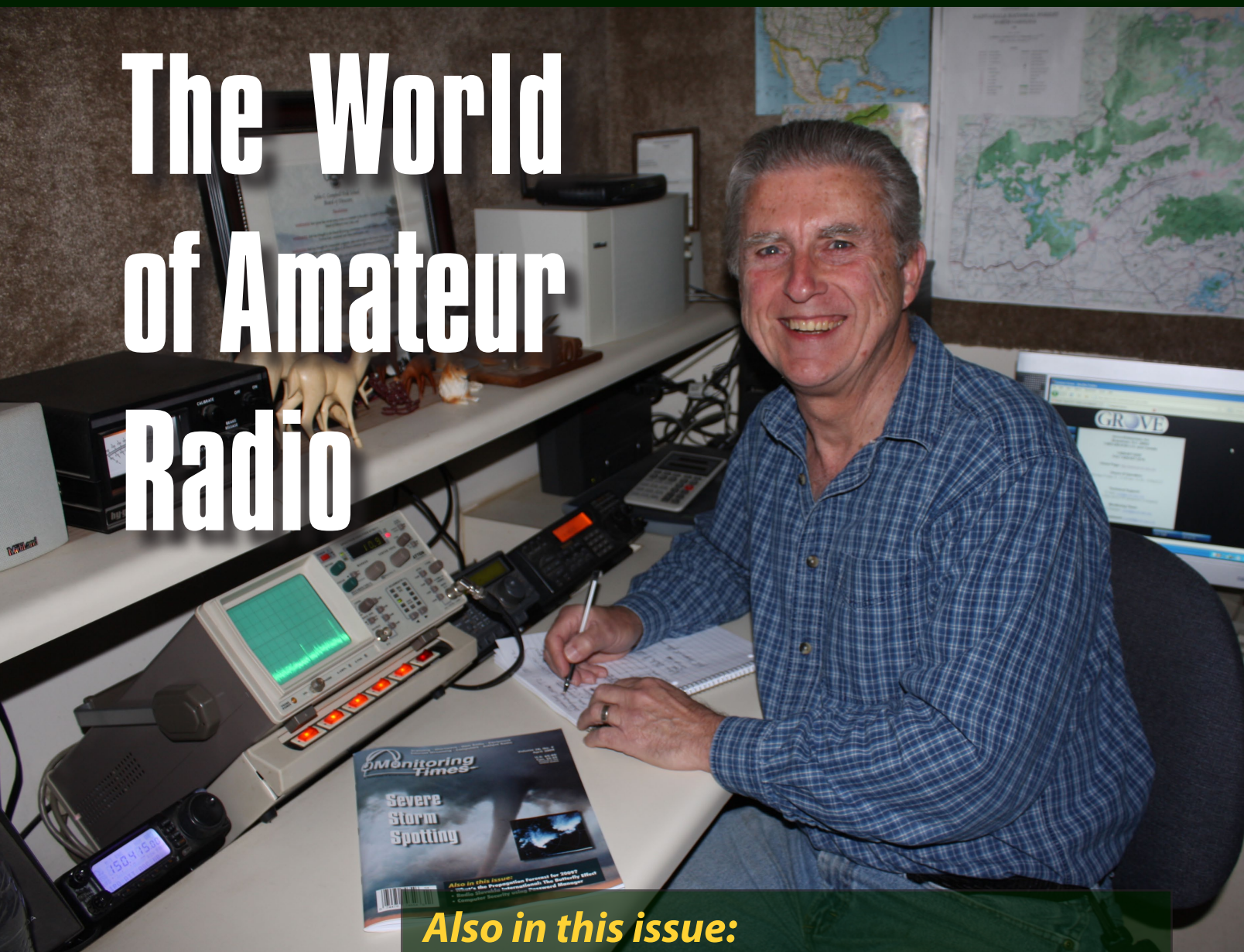
Monitoring Times

A Publication of Grove Enterprises

Volume 28, No. 5
May 2009

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The World of Amateur Radio



Also in this issue:

- Software for the Digital Radio World
- South NJ Emergency D-Star Network
- 10 Reasons to Get Your License
- Frequency Coordination
- Antennas for Amateur Radio



AOR introduces the **AR-Mini**

Big Features! Small Size!

***This pocket-size
communications
receiver delivers BIG
performance!***

The AR-Mini offers legendary AOR quality and a wide array of the most popular features found in the AR-8200 Mark III. But, the new AR-Mini does it all in a convenient pocket size water resistant version that's very easy on a budget.

Whether you use it for work or pleasure, you can take the AR-Mini with you to listen to public safety communications, airline traffic, marine communications, weather channels, trackside communications at car and motorcycle races, radio and television reporters in the field, shortwave communications from around the world, amateur radio frequencies, AM and FM radio signals, analog TV audio and more.

Powered by two AA Ni-MH cells (1.2v), the AR-Mini operates for approximately 22 hours on a single battery charge but it can also be used with AA alkaline batteries or with an optional DC cigar-lighter adapter.



Actual size

AR-Mini Features include:

- 1000 memory channels (10 banks x 100 channels)
- AM, NFM: Triple conversion
WFM: Double conversion
- TCXO for greater stability
- 100kHz ~ 1299.995 MHz (+/-2.5ppm)*
- CTCSS and DCS
- Cloning capability (AR Mini to AR Mini or through PC connection)
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- Automatic or selectable tuning steps
- Scan speed: 8 steps/sec.
- Priority Channel
- 2 VFOs
- Memory channel skip
- Battery save function with auto power off timer
- Free downloadable memory management software
- Preprogrammed "bug" detector frequencies with level beep to find hidden transceivers
- Small size: 2.4" x 3.7" x 0.9" (without projections)
- Weighs only 7.4 oz with antenna and batteries
- Signal meter
- Low battery indicator
- SMA antenna connector

***The AR-Mini is now available
at your favorite AOR dealer!***



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Remarkable Receivers Need Remarkable Antennas!

AX-81S Ruggedized Active HF Antenna

Antenna Type: Active HF Monopole
Frequency Range: 2-30 MHz
Output: IP3: +30 dBm
Operating Temp: -20 to 80°C
Power: 12V DC @ 40 mA

AX-17C Minature Indoor Active HF Antenna

"It was possible to hear some weak signals on the WiNRADiO antenna that were not audible on ... [a top brand of magnetic loop antenna]."
WRTH Review

"As usual with contemporary WiNRADiO products, the AX-17C is very well designed and we have no hesitation in recommending it as a candidate for consideration by those in need of an internal antenna".
WRTH Review

Antenna Type: Active Ferrite Antenna
Frequency Range: 0.1-30 MHz
Output: IP3: +30 dBm
Operating Temp: 0 to 50°C
Power: 12V DC @ 50 mA

WR-G313e Software-Defined Shortwave Receiver

Type: Dual Conversion
Freq Range: 9 kHz to 30 (180) MHz
Phase Noise: -148 dBc/Hz @ 100 kHz
Interface: USB
Power: 12V DC @ 500 mA

"The WiNRADiO G313e is a splendid receiver in all respects, and an excellent example of what can be achieved in a contemporary software-defined radio."
WRTH Review



Monitoring Times

Vol. 28 No. 5

May 2009



Digital Software for the Digital Radio World

By Larry Van Horn

One year ago, *MT* opened your eyes to the sheer number of digital modes to be heard on the air. This year, we address currently-available software packages to receive and decode – and in many cases, transmit – using these modes. Some software also require a hardware interface, but most do not. Even better, the majority of these packages are freeware.

So, no more complaining about dead bands: If you want to know where the traffic went, get on the digital bandwagon and start talking again!

On Our Cover: Publisher Bob Grove W8JHD in his ham shack. Photo by Judy Grove.

C O N T E N T S

NJ South Counties Emergency Radio Network..... 12

By Bill Cole

It all began in 2005 with an emergency exercise, when one of the health service agencies observed amateur radio operators still communicating when everyone else had “lost” their communication systems. This led to a cooperative effort between the various amateur radio emergency service groups to equip New Jersey critical care facilities with amateur radio capability.

A small group of hams in Cape May County who were experimenting with digital technology received a serendipitous boost when they received a grant from Grove Enterprises/Monitoring Times of Icom D-STAR repeater equipment. When the southern New Jersey hospitals and specialty care centers also received a large grant of money for a back-up communications network, work on the D-Star repeater network went into high gear. Although the South Counties Emergency Radio Network (SCERN) is not yet fully deployed, its progress is being followed with interest by other communities.

One thing is for sure: digital communications is becoming the standard for the 21st century.

Ten Reasons to Get Your Amateur Radio License 14

By Skip Arey

Okay, so you’ve heard it all before: You’ll hear it again, because these are really good, really fun reasons for getting your license. Numbers One and Ten are the most important reasons: It’s Easy and It’s Fun.

Amateur Radio: A Fantastic Lifetime Hobby 16

By Arthur Lee

Didn’t I say you would hear it again? Art Lee’s lifetime in the hobby is even longer than Skip’s. His approach may be a little gentler, but the bottom line is the same: This hobby is incredibly rewarding, no matter what your motivation or where you decide to specialize.

Frequency Coordination in the Amateur Radio Service.. 18

By Wayne Heinen

In the spectrum on VHF and above, most communication takes place via repeaters. Have you ever wondered how frequency assignments for those repeaters are made? You might be surprised to learn they are not assigned by the FCC. And, who “makes the rules” for regional bandplans for amateur operations? Why can’t you operate anywhere you want to as long as you’re licensed for that band?

Let us introduce you to the role of the Frequency Coordinator – an essential body of volunteers in the Amateur Radio Service.

Reviews

Par Electronics makes some good antennas, as we found out when reviewing the EF-SWL antennas several years ago. The Par End-Fedz series of HF Ham antennas is in the same family. These antennas show exceptional noise reduction and they are ideal for portable or limited space installations.

A totally different design, Par’s 6-meter Moxon antenna provides the gain of a directional Yagi using half the space. It also breaks down easily for portability. See page 68 for both reviews.

The pocket-sized Degen DE1123 not only covers AM/FM/SW in one tiny package, but it also features 1 gigabyte of flash memory for recording and playback! Digital signal processing makes it all possible. Check it out on page 70.

13,000 radio stations on a thumb drive? That’s what it’s like when you plug the tiny USB Muzee into your computer – the world opens up. It’s as simple as 1, 2, 3. See *Computers & Radio* on page 72 for more.



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Address: 7540 Highway 64 West,
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Telephone: (828) 837-9200
Fax: (828) 837-2216 (24 hours)
Internet Address: www.grove-ent.com or
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Editorial e-mail: editor@monitoringtimes.com
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Subscription Questions?
belinda@grove-ent.com

Owners

Bob and Judy Grove
judy@grove-ent.com

Publisher

Bob Grove, W8JHD
bobgrove@monitoringtimes.com

Managing Editor

Rachel Baughn, KE4OPD
editor@monitoringtimes.com

Assistant Editor

Larry Van Horn, N5FPW
larryvanhorn@monitoringtimes.com

Art Director

Bill Grove

Advertising Svcs.

Beth Leinbach
(828) 389-4007
bethleinbach@monitoringtimes.com

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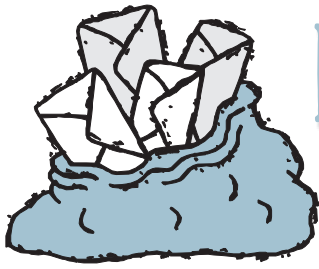
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EDITORIAL STAFF Email firstlast@monitoringtimes.com

TJ "Skip" Arey	On the Ham Bands
Rachel Baughn	Letters to the Editor
Kevin Carey	Below 500 kHz
John Catalano	Computers & Radio
Mike Chace	Digital Digest
Marc Ellis	Radio Restorations
Bob Grove	Ask Bob
Glenn Hauser	Global Forum
Chris Parris	Fed Files
Ken Reitz	Beginners Corner
.....	Communications
Iden Rogers	Planes
Clem Small	Antenna Topics
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Hugh Stegman	Utility World
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Gayle Van Horn	Frequency Manager
.....	Broadcast Logs
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Larry Van Horn	Milcom
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Loyd Van Horn	GlobalNet
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.....	Spotlight
George Zeller	Outer Limits



LETTERS TO THE EDITOR

This column is open to your considered comments. Opinions expressed here are not necessarily those of Monitoring Times. Your letters may be edited or shortened for clarity and length. Please mail to Letters to the Editor, 7540 Hwy 64 West, Brasstown, NC 28902 or email editor@monitoringtimes.com
Happy monitoring!
Rachel Baughn, Editor

Corrections

Clark Rennie pointed out that in the Grove Enterprises ad on page 15 of the March issue, the pictures and prices of the two advertised antennas were reversed. The log-periodic Scanner Beam is ANT18 at \$64.95 and the vertical Omni II is ANT 05 at \$29.95. Thanks for catching our mistake, Clark! We apologize for any confusion the ad may have caused. And, by the way, be sure to check out the "new and improved" Grove catalog on line at www.grove-ent.com. More important than the website redesign, the Grove folks have added bunches of new equipment to their product line, including amateur equipment from Grove's long-time suppliers.

Also, Gregory Dome noted that the April *Ask Bob* column is the same as March's column (except for the final question in each column). We could pretend it was an April Fool's joke or that you guys really needed to hear those answers twice... but truth be told, we hate to "waste" any precious space in *MT*, even for a joke! We apologize for the error and will make the Q&As that were intended for April available on line at www.monitoringtimes.com/html/mtaskbob0409.pdf.

Celebrating Amateur Radio

If it's May, it must be time for the Dayton Hamvention (May 15-17) and the annual amateur radio edition of *Monitoring Times*. We have a lot of features and projects for you this month. Even our *Letters* column is dedicated largely to amateur radio and youth involved in radio. Enjoy!

Contact with Extra Class

"Recently while prowling around the amateur radio 60 meter frequencies, I ran across a YYL working a small pileup on 5371.5. I patiently waited my turn and finally made contact with KS3P – Kaitlyn S. Cole – in Harvest, Alabama.

"I found this young lady a total delight

to chat with. But there is a bit more to this story you should know: Kaitlyn is a 3rd grade student and earned her technician license at age 8. On January 3, 2009, she upgraded to Extra.

"Since her old call KJ4GPG was a bit long, she decided to get a vanity call sign, and now has the first two initials of her given name as her prefix.

"Kaitlyn's interest in ham radio probably comes from the fact she descends from a ham radio family. Her dad is Stan Cole, NX3P; her grandfather is Stan Cole Jr., AD3T (sk); and her grandmother is Susan Cole N3AOK. I am sure that they all have been an influence on Kaitlyn's becoming a part of our exciting hobby of amateur radio.

"So, to Kaitlyn, job well done, and to the rest of you, if you hear her on the air, give her a call, and enjoy a nice chat with a very intelligent and delightful young lady, the future of our amateur radio hobby."

– Larry Van Horn, N5FPW, *MT Assistant Editor*

Signals from Space By Bob Grove W8JHD

In the 1920s, a young engineer at Bell Laboratories, Karl Jansky, was given the task of finding out where the atmospheric static was coming from that was interfering with trans-Atlantic radio circuits. By 1932, Jansky was certain that at least some of them came from space. Later experiments proved that the emissions came from the planet Jupiter. Quite unintentionally, Jansky had founded the science of radio astronomy.

Five years later, an amateur radio operator, Grote Reber, W9GFZ, built a parabolic reflector and pointed it upward to explore the heavens for more radio emissions.

Now, nearly eight decades since Jansky's findings, radio astronomy has blossomed into a full-blown field of scientific discovery and experimentation. Inquisitive students with a technological bent are often drawn to this area of learning.

Youthful Space Explorer

Kenneth Hill is one of those students. At 14 years of age and a sophomore at Murphy (North Carolina) High School, Ken maintains a 4.0 scholastic average, which speaks well for his dedication to his studies. He hopes to go on to college to become an aerospace engineer, but he is the first to admit that being reared by a single mom with limited income poses worries about his future.

In the meantime, however, Ken busies



himself with schoolwork, his extra-curricular memberships in Interact and the Beta Club, and his hobbies which include reading, chess, collecting historic artifacts, and building model aircraft and ships.



Jupiter, by Jove!

Neighbors and passersby are certainly curious about the poles, ropes and wires in his back yard, but to Ken this is his link to space and, hopefully, to his future. The two-element, wire-dipole, phased array is tuned to 20.1 MHz, the same frequency band that Jansky used in his early experiments.

The array points toward the position of the rising sun, poised as it awaits the predictable rise of Jupiter above the horizon. The two dipoles are interconnected so that one coax transmission line leads through his bedroom window and to his JOVE* Project receiver which provides both audible signal presence and an output to his computer trace when Jupiter is in view.

JOVE is a joint educational project between NASA and the Pisgah Astronomical Research Institute (PARI) which occupies an abandoned, cold war, NSA satellite monitoring station in the Pisgah National Forest near Asheville, NC. It's an ideal location, far from radio interference, and still blooming with

Worldwide Friendship

KS3P

Grid Square: EM64
Madison County, AL, USA

Licensed at 8 years old as KJ4GPG.
Upgraded to Extra Class at 9 years old.

Amateur Radio

Kaitlyn Cole
117 Willow Valley Drive
Harvest, AL 35749
email: ks3p@arrl.net

dish antennas erected by its former owner.

The JOVE receivers are available in kit form for \$180 and the antenna kit for \$150 according to Ken, but he was one of the fortunate students who were provided with the materials at no cost.

As I left my visit with Ken, he still had his receiver on, stealthily watching his computer screen for signs of Jupiter rising in the east. I had the distinct impression that I was watching a serious young man with realistic dreams, and with hope that he can afford to follow them.

** (For more information on the PARI/JOVE radio astronomy project and a real-time plot of received signals, visit: www.pari.edu/telescopes/RadioTelescopes/parijove/)*

Real Amateur Radio

By John C McGrath N9AMI

A true-life story about the "real" purpose of amateur radio, and how digital modes saved the day!

January 13, 2009, my cell phone rang at approx 8pm; it was Teresa, my aunt. She stated her father was in a very serious accident in Atlanta and she needed to leave her home in Las Vegas that very night. The problem was that my uncle Dan was working in Guyana, South America, and was not reachable by any means other than ham radio. So I copied her message and told her I would try to get him the

information in the morning on our scheduled time to make contact.

As luck would have it, I had talked Dan into trying digital modes before he left for his month-long trip down south. My reasoning was that he runs a very conservative set-up, and on phone I have trouble hearing him even with my KLM beam. To add to the problem, his 897 was now damaged and was only putting out 15 watts. However, using the new digital setup, I had been able to get about 60 percent copy on PSK31 or Olivia, and he was hearing me 100 percent with my 50 watts.

The morning of trying to pass the emergency traffic, I got on a few hours early just in case conditions were favorable. I kept sending his call de mine: *Dan I have emergency traffic for you. I tried Olivia, PSK31, and CW over and over for a few hours. Finally, all I got back on Olivia was his call and that was it. His copy was so weak it was amazing I received anything, but I did know he was there. So I sent the message:*

Message One: Dan your xyl called and your father in law was in a serious accident and is in critical condition recommend get to satellite phone ASAP. End of Message One Break.

Message Two excerpts: I left you a msg earlier John ... before we got results of CT scan. Prognosis has changed drastically ... they are saying he's got about a 10% chance ... Tell Dan I love him and need him badly right now ... but I realize he's in a position where he may not be able to be here ... End of Message Two Break.

Dan again recommend call her on sat phone ASAP Please Confirm Receipt of Message.

I never did get a confirmation, although I am sure he tried. I sent the same message in CW and PSK again to make sure. That's all I could do and I hoped that he was getting the same kind of signal from me as he did on prior days.

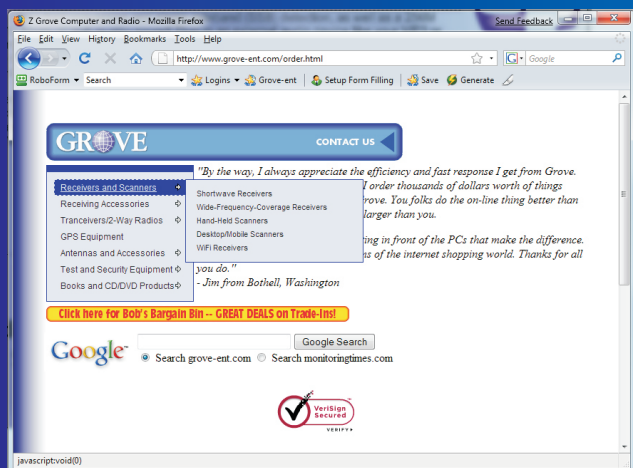
The following morning I left a voice mail for his wife Teresa and asked if Dan contacted her. Later that day I got a call from Dan and he said he just arrived in Atlanta. He received the message the first time and, as luck would have it, the plane that comes in once a week had just left at the end of the message, so they recalled the supply plane and Dan got a ride to Jonestown, and then got a flight to Atlanta. If he had not received the message at that time, he would have not been able to leave for at least another week's time. And if we did not set up communications, he would have never known a thing till he got back to Jonestown in three weeks' time.

With all the things going on in Amateur Radio contesting, experimental operations, etc., this, in my eyes, is what "real Amateur Radio" is: keeping in touch with family out of country and being able to pass along emergency traffic. Although I am not involved and have no interest in ARES or RACES, I now have a better attitude toward the folks involved with these emergency type organizations.

ALL-NEW GROVE WEBSITE!

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"I am writing to let you know that the scanner I ordered arrived yesterday. I have bought a couple of antennas off you in the past and that was a while ago, so I'm not a big customer. When I called you I was treated like I buy from you every day. Your staff was friendly, your mailing was fast and your prices are good. You have won over a full time customer. Raymond S."

800-438-8155

828-837-9200 fax: 828-837-2216

WWW.GROVE-ENT.COM





COMMUNICATIONS

by Ken Reitz

Communications is compiled by Ken Reitz KS4ZR (kenreitz@monitoringtimes.com) from news clippings and links supplied by our readers. Many thanks to this month's fine reporters: Anonymous, Rachel Baughn, Norman Hill, Clem Small, Sterling Marcher, John Mayson, Larry Van Horn, Stephen Yasko, George Zeller.

SHORTWAVE/AMATEUR

ARRL: IBM's BPL Plans OK

In an unprecedented step, through the American Recovery and Reinvestment Act, the federal government will set aside some \$7 billion for broadband build-outs. This is good news, especially for rural areas underserved by high-speed Internet access. It's expected that the National Telecommunications and Information Administration (NTIA) will oversee the use of \$4.7 billion of that money and the Department of Agriculture's Rural Utilities Service will spend \$2.5 billion of the funds.

The money will likely be spent on all forms of broadband access including Broadband over Power Line (BPL) for which IBM has already planned to spend hundreds of millions of dollars. But, hams and shortwave listeners don't need to panic. According to Allen Pitts, ARRL media relations specialist, the League has no problem with the IBM BPL plans.

According to Pitts, IBM's engineers use frequencies outside the HF spectrum and will not pose an interference problem. Pitts reiterated that the League will act decisively in defense of amateur radio frequencies if other companies planning to use BPL decide to launch services that could cause harmful interference to frequencies designated for use by hams.

Bomb Squad Blows up Ham Gear

A story on Omaha, Nebraska TV station KPTM (FOX Channel 42), that aired late February, told about Omaha police evacuating a neighborhood one morning because a cleaning company, in the process of cleaning a house that had caught fire the week before, reportedly found equipment it thought was suspicious. The city's bomb squad flew into action and blew up the offensive object, which turned out to be part of the station of the unfortunate ham who had lived at the house being cleaned.

PUBLIC SERVICE

Indy Cops Gone Wild on 2M

WRTV, Channel 6, Indianapolis, Indiana aired a story in late February about the seizure of dozens of illegal two-way radios that had been routinely mounted in that city's patrol cars. The video report clearly showed the radios to be Kenwood 2 meter amateur radio transceivers mounted snugly in the consoles of the squad cars in a practice that could date back many years. According to the story, hundreds of officers were using the radios that were bought and installed by the city. The report said the police used the radios for official business and as an

unofficial back-channel for "personal chatter."

But, it was the personal chatter that finally got to one ham who would not be identified for the piece. He was tired of the obscenities from the police that he monitored on this new "police band" and took his complaint, along with recordings he had made that contained language prohibited on any band, to the FCC. It was only when the FCC broached the subject to the police department that removal of unlicensed radios was ordered. Even then, according to the report, the police saw swearing on the radio as the only problem.

But, don't look to the FCC for fines here. While the Commission wouldn't hesitate to levy large fines and issue prison sentences to civilians using police frequencies, the FCC is allowing the police department to handle the "problem" internally, according to the report.

Scanner Listener Helps Nab Crooks

North West Cable News (NWCN) reported the arrest in Bremerton, Washington of four members of a counterfeit money ring in early March. The group had used phony \$20 bills to buy, of all things, Girl Scout Cookies. They could fool the Scouts, but not a sharp-eyed clerk at a local drug store the next day who used a counterfeit detection pen to spot the bogus bill.

Notified the bill was a fake, the presenter fled, but not before the clerk took down the miscreant's license plate number. According to the NWCN report, a scanner listener heard the police call, spotted the vehicle and notified the police. Another witness notified the police of other related suspicious activity that eventually led to the arrest of four of the gang, with possibly more to be rounded up later.

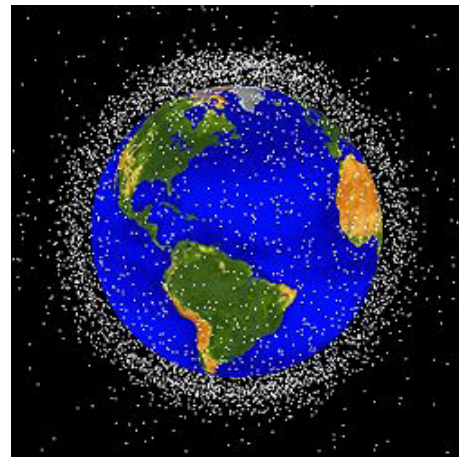
SATELLITES

Iridium & Russian Satellites Collide

A non-functioning Russian satellite (Cosmos 2251) collided on February 10 in Low Earth Orbit (LEO) with an active satellite in the Iridium constellation that provides satellite telephone services world-wide. NASA and the Jet Propulsion Laboratory (JPL) were still investigating the causes as of this writing and assessing the damage potential from the resulting debris cloud created at an altitude of 500 miles.

The International Space Station (ISS) flies about 300 miles below the level of the collision, while the Hubble Space Telescope and other Earth observation satellites fly much higher than the collision altitude, so that none of those spacecraft were thought to be in immediate danger.

According to Russia's Pravda news agency, the Cosmos 2251 satellite was a "military com-



Ring of junk. This is a NASA artist's conception of orbital debris as seen at the Low Earth Orbit (LEO) level. (Courtesy: NASA orbital debris program).

munications satellite" that was launched in 1983 and stopped operating five years ago. Pravda reported that it's been roaming its LEO as space junk since. Iridium reported that it had replaced its own damaged satellite by March, 4 and that their business was uninterrupted.

The U.S. Joint Space Operations Center, which tracks space debris, was said to have initially been tracking more than 500 pieces as a result of the collision, which had caught the Pentagon, NASA and the European Space Agency (ESA) flat-footed. It was Iridium that was apparently first to announce the collision. Shortly after the accident, ESA announced plans to launch its own program to track space debris which they will call Space Situational Awareness and will have an initial budget of \$64 million, according to reports.

In an unrelated incident, NASA reported on March 12 that the three astronauts aboard the ISS were ordered into the Soyuz escape capsule when a piece of space debris was said to be within a range where a collision was possible. While not specifying that range or identifying the source of the debris, NASA did report that the debris was about one-third of an inch wide.

Pollution Detecting Satellite Now Trash

NASA reported that a satellite known as the Orbiting Carbon Observatory, designed to measure greenhouse gas emissions and focus on the dangers of global warming, crashed February 25 after its protective shroud failed to separate from the booster rocket that was carrying the \$278 million bird into space. It plunged instead into the icy depths of the Antarctic Ocean.

The launch took place from Vandenberg Air Force base in California and was seen as a



NASA's ill-fated Orbiting Carbon Observatory is now observing ice in the Antarctic Ocean. (Courtesy: NASA)

severe setback to NASA and Orbital Sciences Corp., the Dulles, Virginia-based company that built the satellite. According to NASA, ground controllers first noticed a problem less than two minutes into the flight when the rocket did not accelerate as expected after the shroud should have been ejected.

Sirius/XM Saga: Last Second Reprieve

In our last exciting episode, Sirius/XM satellite radio king, Mel Karmazin, was clinging by his fingernails to the edge of Bankruptcy Cliff. DISH Network black knight, Charlie Ergen, arrived and offered to throw the King a rope. But, Mel suspected Charlie might have other ideas with the rope and, just when all hope was nearly lost, DirecTV white knight, John Malone, arrived with an offer Mel could not refuse. Thus, the Kingdom was spared, Mel kept his job, Charlie was thwarted, and John got what he really needed: blessed tax-relief for his highly profitable satellite TV company. And, they pretty much all lived happily ever after, at least for the rest of this year.

BROADCASTING

DTV Switch Lurching Ahead

Two weeks after the original Digital TV switch date (February, 19) the National Telecommunications & Information Administration (NTIA) had amassed a backlog of 7.5 million DTV coupon requests. The program had run out of funds by January 4 which had, in part, prompted the delay in full implementation of the switch to June 12. By March 12, the NTIA had announced that it had fulfilled requests for 3.4 million coupons from the waiting list and was within "two to three weeks" of clearing out the backlog of the remaining 4.1 million coupon requests.

While the DTV Delay Act, signed by President Obama on February 11, allows NTIA to issue replacement coupons to households whose coupons have expired without being used, NTIA was not accepting requests for replacement coupons as of this writing. The NTIA also reported that by February 19 only 36% of TV stations nationwide had shut down their analog broadcasts.

The DTV switch had been predicted by business analysts to be a big windfall for cable and satellite TV providers. But, that windfall has not materialized, according to a note in **SkyRe-**

port.com which reported that, as the original switch date approached, "...cable and satellite TV providers aren't seeing anywhere near the subscribership bump they had expected. In fact, by all accounts OTA [over-the-air] viewers are sticking with their free TV." That forced analysts to cut by half their expectation of conversions related to the transition.

Tallest Broadcast Tower Proposal

An Oklahoma-based company is seeking approval to erect a 1,500-foot free-standing broadcast tower on a 3.6 acre site owned by McHenry County College in northwest Illinois. According to an article in the *North West Herald*, the company will pay the college \$6 million for the land and an additional \$1 million if the company can sell all five broadcast positions on the tower within the first five years of the agreement.

While the college saw this offer as a welcome source of income in tough economic times, opposition quickly sprung up from area residents who worry that the tower, whose lights would reportedly be seen as far as 30 miles away, would offend their eyes. Unspecified safety issues were also raised, and one objector believed the price offered by the company was too low. But, that may be the least of the company's worries. They'll need approval from the FCC and the FAA as well as all of the local political stakeholders before they can even break ground for the project.

R.I.P. Muzak?

The sound of watered-down hits played by tired orchestras through tinny speakers in elevators, restaurants, waiting rooms, and anywhere else humanity is forced to huddle, was dealt a serious blow when the 75 year-old Muzak company filed for bankruptcy in February. But, you have not heard the last of Muzak! Chapter 11 is merely reorganization of the business and, as Muzak CEO, Stephen Villa said, in a company press release, "We intend to move through this process as quickly as possible, and we firmly believe that this course of action will better position Muzak for long-term success."

But, competition from Sirius/XM for Business, DMX Direct and other background music providers with less expensive equipment and more extensive music formats may make the reorganization process longer than Muzak imagines.

FCC ENFORCEMENT

Incomplete Public Files? \$7,200

Wayne State College in Wayne, Nebraska operates KWSC (FM), a 320 watt, non-commercial station at the college. It's a modest operation, as most similar college stations are, but it came under the FCC's unforgiving glare when it owned up to not having had all its public file papers correctly filed from the third quarter of 2001 through the fourth quarter of 2004. The Commission ruled that that constitutes "willful and repeated violation" and required a \$9,000 fine. The Commission heard the station's appeal and noted that it had a history of otherwise



KWSC, "The Cat 91.9" fined for disorderly files.

complying with FCC rules and whacked \$1,800 off the fine.

KUOA-AM, a for-profit AM-FM outlet in Siloam Springs, Arkansas knew better than to claim destitution as non-commercial stations usually do when assessed an FCC fine. Their public record files were also not in order ("willful and repeated" says the Commission) and they were originally hit with a \$10,000 fine. The station argued its way out of \$2,800 worth of the fines and received the same \$7,200 fine as KWSC in the previous case.

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Digital Software for the Digital Radio World

By Larry Van Horn, N5FPW

MT Assistant Editor



It is a revolution like no other in the history of the radio hobby – the digital age. Just a few short years ago, RTTY communications using mechanic devices was the extent of the digital world for amateur radio operators. Today, we have a plethora of modes, and the mechanical beasts of old have been replaced by the personal computer and the sound card.

I presented some of the basics of digital modes and monitoring in a feature article that appeared in the May 2008 issue of *Monitoring Times* (*Working the World with Ham Digital Modes*), so I won't repeat that effort here. What I will discuss are some of the more popular software packages and what capabilities you will have when you put them in use in your shack.

Digital Software – The Basics

I recently performed an online survey to see what software was available to decode digital signals. The good news I came up with is that there are a bunch of really nice software packages available on the net and most of them are freeware.

There are several types of software packages available. All of them require a hardware interface to do both transmit and receive, but if receiving is your game, most only require you to plug in an audio cable in between the receiver/transceiver and the computer sound card in order to decode the digital signals they can handle.

Interfaces and Hardware Decoders

For many years, Hams and SWLs used hardware-based decoders to receive digital signals. Most of the older hobbyists remember the Universal decoder boxes, which were the Cadillac of decoders in their day. There are still quite a few hardware-based decoders in the marketplace, such as the Wavecom products offered through Grove Enterprises.

Other packages are a mixture: some software packages, such as the WinRadio digital decoders, are specific to certain receivers, and have limited modes that they can decode. Still other software packages use a hardware interface or connection through one of the computer ports

(serial, parallel or USB) in order to decode the digital modes. They often have on-screen tuning aids, and other devices to aid in tuning and decoding a signal.

These programs have not been as popular in recent years, but they are still an important part of the hobby since they can decode some of the more exotic modes used in the radio spectrum that are not offered elsewhere. Because the companies offering these software packages, in many cases, have to obtain a license from the originator of those modes, these units typically sell for higher prices and may not be available in this country due to current FCC regulations and restrictions. Section A of our software resource guide lists some of the companies and software packages that are currently being marketed.

Contests and Logbooks

If you are an amateur radio operator, this section will be music to your ears. For some of us who chase wallpaper and QSLs, logging is a necessary evil. If you are a contester, maintaining a computerized logbook of contacts made during the contest is a must. The days of paper logs used by contesters is pretty much over.

When you are working the ham digital modes, computerized logging is also pretty much a must. To combine the decoding of digital signals with a logging function into one integrated package is a dream.

In recent years, we have seen quite a few of these programs become available on the internet. And the price range for these integrated logbook/decoder programs runs the full gamut from commercial software to beerware and freeware.

For many years now, my personal favorite in this category is **Logger 32** by K4CY. Logger32 is a 32-bit amateur radio logging program written by Bob Furzer, K4CY. Bob is also the author of Zakanaka, and a 16-bit version of Logger. Logger32 runs under Windows 95/98, Windows 2000, Windows ME, Windows NT and Windows XP.

Logger32 was developed to be a user configurable, general purpose, amateur radio logbook with computer control support for many radios and antenna rotators. It is not a contesting log, although there is no real reason why it could not be used for such, even though it does not contain some features that might be found in

software specifically designed for this activity.

On the digital front Logger32 uses BIntegration of MMTTY and MMVARI programs for PSK31/PSK63 and RTTY which includes:

Three independent, simultaneous receive channels in PSK31, Waterfall or spectral signal display. RTTY operation (including 23 Hz) using MMTTY module written by Mako Mori.

This program has online support through its Yahoogroup and the price is right – free!

For my digital contesting program, I have used in recent years the **N1MM Contest Logger** program. The N1MM Logger is also a freeware program designed to do contest logging and some general logging. It is not a general logging program with award tracking, etc. (for which I use Logger32), but is mainly a contest logging program. Some of the features include:

All major HF Contests are supported including General DX logging, DXpedition, DXSatellit and VHFdx.

Uses sound card for DVK (digital voice keying), but also DVK interface for W9XT and other DVK's. Automatic CW generation.

RTTY support using MMTTY, HAL DXP38 and other external TNC's (like PK-232)

Other digital modes like PSK31 and PSK63 support using the MMVARI engine.

Radio interface to support radios from Kenwood, many Yaesu rigs (for example: FT-1000, FT-1000MP, FT-990, FT-920 and more), Icom, TenTec Orion and Elecraft.

Two radio support. Two VFO support when using one radio.

LPT port functionality to control antenna switches, radio selected, and PTT (95/98/ME/NT/2000/XP).

Two monitor support (Requires Win 98 or better). Transverter support (SHF bands supported up to 10, 24, 47, 76, 142 and 241 GHz).

Rotator control (Using N1MM Rotor, LP-Rotor or ARSWIN).

This logging program has been designed to work on a Pentium II/III 500-800 MHz, 128 MB as a minimum platform. Thus, it runs reasonably on a 500-MHz Pentium II. Operating systems supported by this program include Windows 98/ME/NT/2k/XP.

Outside of my two personal favorite programs mentioned above, two other programs deserve a mention and have large followings in

the ham community. These two programs are **Ham Radio Deluxe** and **WriteLog for Windows**. You can see our complete list of these programs in Section B of our software resource guide.

Soundcard Digital Decoders

First, let me make sure that you are clear about the programs in the previous section. They all use or are integrated with sound card decoder programs. But, because they are primarily log-book programs, I kept them separated from the rest of the programs I am about to discuss.

The most active area of development for programmers of digital mode programs has been in the area of decoding using a simple connection to a sound card in a computer. There are a lot of these programs available on the net, with more coming on nearly a regular basis. Many of these programs have extensive tuning aids, waterfall displays, and other devices to help decode (and sometimes analyze) an unknown signal.

By far the most popular modes these days are the PSK modes, and they are well represented with all sorts of software programs to decode and transmit PSK transmissions in the ham bands. A quick check of Section C of our software resource guides shows over 20 software packages found during our online survey that are dedicated to decoding the family of PSK modes (this total does not include the many other software packages that include the mode as part of their digital decoding suite). No self respecting software author these days would omit the PSK modes as part of their program unless their program specializes in some of the other digital modes in use on the ham bands and elsewhere.

Multimode Decoders

If you are sort of an all-in-one kind of monitor (like a lot of us older guys from the hardware decoder days), then you will appreciate our list of Multimode decoders in Section C.

My personal favorite here is **MultiPSK**, authored by F6CTE, Pat Lindecker, in France. The basic program is free, but for a small fee, you can add on additional modes and capability, well worth the price. So what goodies does this program have to offer? The latest version is 4.12 and can decode and in some cases transmit the following modes:

Phase Shift Keying modes:
BPSK: BPSK31-63-125-250 / CHIP (64/128) / PSK10 / PSKFEC31 / PSKAM10-31-50
BPSK with SSTV: PSK63 F - PSK220F + DIGISSTV "Run"
QPSK: QPSK31-63-125-250
MPSK: MT63
On-Off Keying Modes:
CW / CCW-OOK / CCW-FSK / QRSS
Frequency Shift Keying modes:
PACKET: 110-300-1200 bauds + APRS+ DIGISSTV "Run"
FACTOR 1 / AMTOR FEC-Navtex / AMTOR ARQ / SITOR A
ASCII / RTTY 45-50-75-100-110-150-200 / SYNOP + SHIP
1382 / GMDSS DSC / ACARS (VHF) / DGPS
Multi Frequency Shift Keying modes:
MFSK8 / MFSK16 (+SSTV)
OLIVIA / Contestia / RTTYM / VOICE
THROB/THROBX
DominoF / DominoEX
PAX / PAX2
Automatic Link Establishment (see www.hflink.com) MIL-STD-188-141A+
ARQ FAE / ALE400 + ARQ FAE
DTMF, SELCAL
JT65 (A B and C)
Hellschreiber modes:
FELD HELL / FM HELL(105-245) / PSK HELL / HELL 80
Graphic modes:
HF FAX / SSTV / PSK SSTV modes (mentioned above) / MFSK116 SSTV (mentioned above)
DSP modes:
Filters / Analysis / Binaural CW reception
RTTY, CW, BPSK31, BPSK63 and PSKFEC31
Panoramics
Identifiers:
Video ID / RS ID / Call ID
TCP/IP digital modem

Now, that is enough to keep a ham busy for years to come, trying to get a Worked All States or DXCC in each of the modes listed above!

If you like to prowl outside of the ham bands and want to decode some of the interesting modes seen there, I recommend one of the commercial decoders from SkySweep. This is a high-tech company with their main focus on the high quality radio software for Windows. They offer three software packages:

SkySweeper Standard 3.09 provides the professional quality HF/VHF decoders, transmitters, DSP functions and analyzers for a ham friendly price.

SkySweeper Standard Plus 4.09 version is targeted to advanced hams or SWLs seeking even more decoders and analyzers than SkySweeper Standard provides.

SkySweeper Professional 5.09 is for the real professionals, providing advanced analyzer and generic (universal) decoder tools.

Even though this is a European-based company, their US dealer is one of the most respected radio hobby companies in the U.S. — Computer Aided Technologies based in Louisiana and run by Jim Springer. You won't have any problems with tech support on any of the SkySweep software packages, thanks to this fine company.

Decoders for other modes

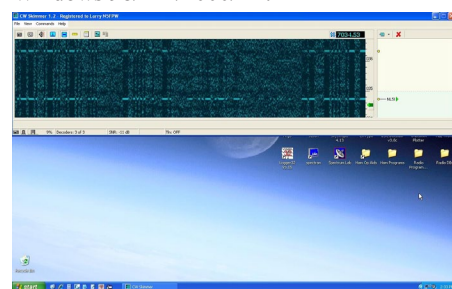
Other modes, for purposes of discussion in this article, can be a variety of things from ACARS to the WSJT weak signal modes. There is a lot out there to download (most are free) and experiment with. If you have a computer, receiver, and audio cable, and the downloads are free, it's time to experiment and experience the joys of digital DXing. You really don't have an excuse not to.

For instance, I have always been intrigued with Slow Scan TV (SSTV). The thought of being able to send my own picture across the airways has always been a desire of mine. There are several fine software packages in the SSTV section of our resource guide that do a nice job of sending and decoding SSTV images. So far, I have experimented with the receive side of things, but if you happen to be around 14.232 MHz one of these days and see a picture from N5FPW, be sure to give me a shout.

Longwave enthusiasts will be interested in several software packages we have on our list. **Argo**, **DXSoft CwGet**, **GLFER**, **Jason**, **QRS**, and **WOLF** will open up new monitoring possibilities for the lowband enthusiast.

If you are a marine or weather junkie, then go to our guide for the following software downloads: **DSC Decoder** (I love using this one in the shack), **DXSoft SeaTTY**, **Frisnit NAVTEX Decoder**, **Meteoware**, **POSFIX**, and **SSC PC HF Facsimile**. Aircraft monitors will be interested in the **Airnav ACARS Decoder** and **PC-HFDL**.

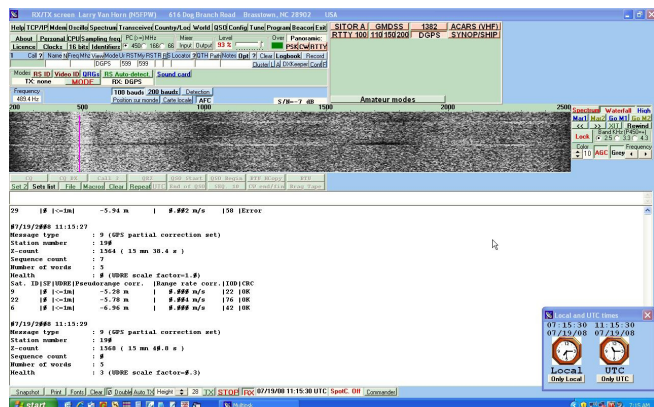
One of the more controversial programs on our list decodes CW, but has sparked a major debate in the ham contest community over its usage. Some have called it monstrous and others have called it a killer monitoring tool. The **CW Skimmer** by VE3NEA (Afreet Software) is a multi-channel CW decoder and analyzer for Windows 98/ME/2000/XP.



So what is all the controversy about? The CW Skimmer allows for multi-channel decoding and that is what is rubbing the ham contest community the wrong way. They claim users of the Skimmer will have an advantage during CW contests.

Some of the features of this program include:

- a very sensitive CW decoding algorithm based on the methods of Bayesian statistics;
- simultaneous decoding of all CW signals in the receiver passband -- up to 700 signals can be decoded in parallel on a 3-GHz P4 if a wide-band receiver is used;
- a fast waterfall display, with a resolution sufficient for reading Morse Code dots and dashes visually;
- the callsigns are extracted from the decoded mes-



sages, and the traces on the waterfall are labeled with stations' callsigns; the extracted callsigns are exported as DX cluster spots via the built-in Telnet cluster server; a DSP processor with a noise blanker, AGC, and a sharp, variable-bandwidth CW filter; and an I/Q Recorder and player.

I have tested the CW Skimmer here in my shack and it decodes CW quite well (the best CW decoding package I tested). If you are into CW and have \$75 to burn (shareware with a 30 day demo period), this decoder is well worth the money.

If you really want to get cutting edge and experiment with some of the newer digital modes, then some of the software downloads that follow will interest you. They include **DominoEX**, **Experimental NBTv** and **Digi NBTv**, **FDMDV - Frequency Division Multiplex Digital Voice**, **HamDream** (DRM voice), **Hamview** (weak signal software), **IZ8BLY Chip64/128**, **IZ8BLY Hellschreiber**, **IZ8BLY MT63 Terminal**, **IZ8BLY Stream** (MFSK8/16), **MEPT-WSPR**, **Multi Frequency Tele Type**, **Multitone**, **PC-ALE**, **SlowfeldXPas** (aircraft scatter software), **Throb 2.5x3.3**, **WinDRM**, **WinMOR**, **WSJT** (weak signal meteor scatter and EME software), and **WS Tools** for Linux / Windows. This list of interesting software should keep you busy exploring the digital radio spectrum for some time to come.

DSP Audio Programs

Are you looking for a digital mode analyzer or tuning aid? With the development of DSP processing and the popularity of soundcard programs, such programs are now readily available. Some allow you to create your own filters, view a signal with an audio spectrum analyzer, and much more. Check out Section D of our resource for a sampling of the many programs available for download from the internet.

Soundcard Interfaces

Finally, if you have a ham license and are interested in joining the digital revolution, you will need a soundcard interface. This electronic device is used to make the connection between the computer's soundcard and the transceiver. These interfaces are a necessity if you are going to *transmit* digital communication, and they offer many advantages, not the least of which is good isolation and suppressing problems such as hum and ground loops.

There are plans on the net, if you want to roll your own, or you can buy it from one of the many manufacturers who produce these devices commercially now. I have been using the **RigBlaster** series from West Mountain Radio in my shack for several years now with excellent results and reliability.

The good folks at MFJ also offer good quality interfaces at a decent price and they are also very reliable.

So there you have it

Now, with this article in hand and a computer with a sound card, you can join in on the digital revolution, no more excuses. It is a lot of fun, it can sharpen your monitoring and operating skills, and I guarantee that you will discover a new world that you didn't even know existed. And make sure you are on the look-out for that N5FPW fellow. He is always good for a chat or two regardless of the digital mode you select.

Even if you don't operate on the ham bands, the software packages we have presented in this article can open up a whole new world of radio listening for the SWL. You only *thought* the bands were dead...

Isn't it time for you to download some radio software? Come join in with the rest of us who are communicating with the world via the digital radio revolution.

MT SOFTWARE RESOURCE GUIDE

Section A – Decoders: Hardware Interface/Hardware Specific Software

Bonito RadioCom 5.2: www.computer-int.com/rc.htm
 Bonito RadioCom 6: www.computer-int.com/radiocom_6.htm
 Hamcomm 3.1 (Unofficial Page): www.pervisell.com/ham/hc1.htm
 Hoka Code3 (Old Product): www.hoka.net/old_product/code3/code3uk.htm
 Hoka Code3 Gold (Old Product): www.hoka.net/old_product/code3gold/code3golduk.htm
 Hoka Code3 Gold Professional: www.hoka.net/old_product/code3goldpro/code3goldprouk.htm
 Hoka Code300-32: www.hoka.com/code300-32/code300-32.htm
 Intercom RTTY: www.jpwise.no/cgi-bin/index.cgi?action=downloadinfo&cat=rtty&id=3
 JVComm-32: www.jvcomm.de/index_e.html
 RadioRaft 3.21: <http://pagesperso-orange.fr/radioraft/> and <http://radioraft.free.fr/>
 RFSM-8000: <http://rfsm2400.radioscanner.ru/>
 RxPlus 1.91: <http://teledata.qc.ca/RxPlus/index.php>
 shoc RSM: www.shoc.ch/shocrsm.htm
 Synop Decoder Active/X 1.4.1.3: <http://rxcontrol.free.fr/SynopCtl/index.html>
 WaveCom W61PC : www.wavecom.ch/w61PC.htm
 WinRadio Advanced Digital Suite: www.winradio.com/home/ads.htm
 WinRadio Digital Suite: www.winradio.com/home/ds.htm
 WinRadio Universal FSK Decoder: www.winradio.com/home/fskdecoder.htm

Section B – Contest Software and Logbooks (that support digital modes)

AALog 3: www.dxsoft.com/en/products/aalog/ (CwGet/TrueTTY)
 CQLog: www.cqlog.com/ (CwGet/DigiPan/MixW/TrueTTY)
 DX4WIN: www.dx4win.com/download.htm
 Dxbase: www.dxbase.com/
 EasyLog5: www.easylog.com/eng/easylog5main.htm
 Ham Radio Deluxe : www.ham-radio-deluxe.com/Home/tabid/36/Default.aspx
 Logger 32: www.logger32.net/ (MMTTY-MMVARI)
 LOGic 8: <http://hosenose.com/radio/default.asp> (DigiPan/Hamscope/MixW)
 LogPA: www.xs4all.nl/~ravelden/logpa.shtml
 miLog 9.4.3: www.hamtoys.com/
 N1MM Logger: www.n1mm.com/
 RCKRTTY: www.rckrtty.de/
 SwissLog: www.informatix.li/ (Hamscope/MixW/TrueTTY)
 UcxLog: www.dl7ucx.de/ (MMTTY-MMVARI)
 WinLog32: www.winlog32.co.uk/ (MixW)
 WinTest: www.win-test.com/ (MMTTY)
 WLog2000: www.wlog2000.com/
 WriteLog for Windows: www.writelog.com/
 YPLog: <http://members.shaw.ca/ve6yp/>

Section C – Digital Soundcard Software and more

PSK Modes
 Contact-PSK 4.5 (Spanish): www.ea1cui.com/
 DanPSK: www.qsl.net/oz5pc/dlfrm.htm
 Digipan 2.0: www.digipan.net/
 DigiPic: www.qsl.net/kh6ty/digipic/
 Digitaltalk PSK31 Software for Sight Impaired: www.qsl.net/kh6ty/digitaltalk.htm
 DXPSK 2.6a: <http://dxfile.free.fr/dxpsk.htm> [English/French]
 FNpsk: www.w1fn.org/fnpsk/index.html
 KC9L PSK: www.qsl.net/kc9l/
 PhaseShift (Linux0 : www.qsl.net/n1vtn/phaseshift.html
 PSK63: www.qsl.net/kh6ty/psk63/
 QuikPSK31/63: www.qsl.net/kh6ty/psk63/quikpsk.html
 RoMac PSK31 (Mac OS): www.romacsoftware.com/psk31default.asp
 RX-PSK31: <http://users.belgacom.net/hamradio/rxpsk31.htm>
 SMARTPSK 1.6: <http://dxfile.free.fr/dxpsk.htm> [English/French]
 TWPSK (Linux): <http://wa0eir.home.mchsi.com/>
 W1SQL PSK 4.2: www.faria.net/w1sql/
 WinPSK 2.13: www.moetronix.com/ae4jy/winpsk.htm
 winPSKse 2.23: www.hamsource.com/winpskse/
 WinPSKX: www.qsl.net/kh6ty/psk63/quikpsk.html (plus other accessory software)
 WinWarbler (Part of DXLab): www.dxlabsuite.com/winwarbler/ (Includes RTTY modes)
 WO-PSK: www.qsl.net/zs5wo/download.htm



Multimode Software

AirLink Express (Support includes Vista 32/64): www.airlinkexpress.org/features.htm
Black Cat Systems (Mac OS) Multimode: www.blackcatsystems.com/software/multimode.html
DXSoft TrueTTY 2.75: www.dxsoft.com/en/products/truetty/
Fldigi (Linux/Windows): www.w1hkj.com/Fldigi.html
FTV MS-DOS Decoder (Win95/98): <http://ftv.3amsystems.com/gMFSK> (Linux): <http://gmfsk.connect.fi/>
Ham Radio Deluxe Digital Master 780: www.ham-radio-deluxe.com/
Hamscope 1.56: www.qsl.net/hamscope/
KROT Multi Mode (Russian): www.radiokrot.nm.ru/index.html
MixW 2.19: <http://mixw.net/>
MMVARI 0.40: www.qsl.net/ok2pya/digimodes/
MultiPSK 4.12: http://f6cte.free.fr/index_anglais.htm
PocketDigi: www.n0hr.com/PocketDigi/PocketDigi_intro.htm
Sigmira 1r3 (SDR-IQ): www.saharlow.com/technology/sigmira/index.htm
SkySweeper Software: www.skysweeper.com/ [There is a Standard, Standard Plus and Professional versions]
US Dealer – Computer Aided Technologies: www.scancat.com/

SSTV Mode Software

ChromaPix: www.barberdsp.com/cpix/chroma.htm
DigiAce: <http://homepage.ntlworld.com/mhemmerson/>
DIGTRX: www.tima.com/~djones/
EasyPal: www.kc1cs.com/
HamPal DRM Digital SSTV: www.kiva.net/~djones/hampal.htm
HDSSTV: <http://svs.net/wyman/examples/hdsstv/index.html>
InterAce 1.8a: www.g4xgt.co.uk/interace-sstv.htm [Internet SSTV for Echolink]
MacRobot: <http://homepage.mac.com/kd6cjl/>
MMSSTV: <http://mmhamsoft.amateur-radio.ca/mmsstv/>
MSCAN from CombiTech: www.mscan.com/
ProSkan: http://webpages.charter.net/jamie_5/
QSSTV (Linux): <http://users.telenet.be/on4qz/>
SC-4 & Charly: www.wesacom.de/sstv/
SSTV32: http://webpages.charter.net/jamie_5/
SSTVPAL MultiMode: www.dzzone.com/catalog/Software/SSTV/
SSTV w/SoundBlaster: www.hampubs.com/sstvwith.htm
W95SSTV: www.barberdsp.com/w95sstv/w95sstv.htm
WinSkan: http://webpages.charter.net/jamie_5/

Other Miscellaneous Modes

Airnav ACARS Decoder: www.airnavsystems.com/ACARS/
Argo: www.weaksignals.com/
Blaster TeLetype: www.geocities.com/SiliconValley/Heights/4477/?20096
CW Decoder: www.hotamateurprograms.com/downloads.htm
CW Skimmer 1.4: www.dxatlas.com/CwSkimmer/
DominoEX: <http://homepages.iuhg.co.nz/~coombedn/FILES/DominoEXj.zip>
DSC Decoder: www.coaa.co.uk/dscdecoder.htm
DXSoft CwGet 1.8: www.dxsoft.com/en/products/cwget/
DXSoft CwType 1.75: www.dxsoft.com/en/products/cwtype/
DXSoft SeaTTY 2.20: www.dxsoft.com/en/products/seatty/
Experimental NBTv and Digi NBTv: <http://au.geocities.com/vk3hjq/vk3hjq/sstv.htm>
FDMdV-Frequency Division Multiplex Digital Voice: <http://n1su.com/fdmv/>
Flarq: www.w1hkj.com/flarq_main.html
Frisnit NAVTEX Decoder: www.frisnit.com/navtex/
GLFER (Linux): www.qsl.net/in3otd/glfer.html
HamDream (DRM Voice): www.qslnet.de/member/hb9tlk/
Hamview (Weak Signal Software): www.k3pgp.org/Hamview/hamview.htm
I28BLY Chip64/128: <http://xoomer.virgilio.it/aporcino/Chip64/index.htm>
I28BLY HellSchreiber: <http://xoomer.virgilio.it/aporcino/Hell/index.htm>
I28BLY MT63 Terminal: <http://xoomer.virgilio.it/aporcino/MT63/index.htm>
I28BLY Stream (MFSK8/16): <http://xoomer.virgilio.it/aporcino/Stream/index.htm>
Jason: www.weaksignals.com/jason/
MEPT-WSPR: <http://physics.princeton.edu/pulsar/K1JT/>
Meteoware: www.geocities.com/meteoware/
MMTTY 1.66g: <http://mmhamsoft.amateur-radio.ca/mmtty/index.html>
MRP40: www.polar-electric.com/Morse/MRP40-EN/index.htm
Multi Frequency Tele Type: www.polar-electric.com/MFTT/index.html
Multi Platform Soundcard Packet: www.baycom.org/~tom/ham/soundmodem/
MultiTone: www.qsl.net/on7yd/software.htm
OliviaAid: www.n1su.com/olivia/
PC-ALE via the HF Link group: www.hflink.com
PC-HFDL: <http://groups.yahoo.com/group/hfdl/>

POSFIX 2.4.5: www.posfix.co.uk/
QRS: www.qsl.net/on7yd/software.htm
Radio Operations Center: www.cssincorp.com/Radio_Operations_Center_Software.html (formerly PacTerm and PKTerm)
SlowfeldXPas (Aircraft Scatter Software): www.lsear.freeseerve.co.uk/aircraft%20scatter.html
Soundcard Packet: www.kc2rlm.info/soundcardpacket/ [AGWPE SV2AGW Packet Engine]
SSC PC HF Facsimile 8.1: www.sccorp.com/products.htm
Throb 2.5x3.3: www.dl5swb.de/html/throb_2_5x3_3.htm
TTY Terminal Software: <http://rxcontrol.free.fr/TTYTerm/index.html>
UISS (Packet program): <http://users.belgacom.net/hamradio/uiss.htm>
WinDRM: <http://n1su.com/windrm/>
WinMOR: <http://groups.yahoo.com/group/WINMOR/>
WinPack 6.8: www.winpack.org.uk/
WOLF: www.scgroup.com/ham/wolf.html
WSJT modes: <http://physics.princeton.edu/pulsar/K1JT/>
WS Tools (Linux/Windows): <http://www.qsl.net/g4klx/software.htm>

Section D – DSP Audio Programs

Analysr 2000 5.05: www.brownbear.de/
Audacity 1.2.6: <http://audacity.sourceforge.net/>
ChromaSound Beta 0.19: www.barberdsp.com/csnd/csnd.htm
DL4YHF Audio Spectrum Analyzer: www.qsl.net/dl4yh/spectra1.html
DSP Filter: <http://mmhamsoft.amateur-radio.ca/dsp/index.htm>
Echo Filter: www.computecsa.co.za/echofilter/
GNASPI Audio Signal Processor: www.boatanchors.de/software/gnaspi.html
HamAnalyzer Audio Spectrum Analyzer: www.hamalyzer.com/
Spectran: www.weaksignals.com/spectran.html
Spectrogram 16: www.visualizationsoftware.com/gram.html
SR5 Spectrum Analyzer (AR5000): www.ar5.ndo.co.uk/

Section E – Soundcard Digital Interfaces

Buxcomm Rascal: www.buxcomm.com/catalog/index.php?main_page=index&cPath=2
Donner's Digital Interfaces: <http://home.att.net/~n8st/DDI-index.html>
G8SLB Interfaces: www.angelfire.com/ok/g8slb/g8slbp2g2.html#vox
MFJ Soundcard Interfaces: www.mfjenterprises.com/Search.php?searchit=soundcard
Tigertronics Signalink: www.tigertronics.com/sl+main.htm
West Mountain Radio Rigblasters: www.westmountainradio.com/RIGblaster.htm

Section F – Miscellaneous Software

AirMail Express (Windows): www.airmail2000.com/ (Message Software)
Irfanview Software: www.irfanview.com/
JPSKMail (Windows): <http://pskmail.wikispaces.com/> (Message Software)
LanLink: www.qsl.net/vk5wu/LLwindows.htm
Narrow Band Emergency Messaging System (NBEMS): www.w1hkj.com/NBEMS/ (Weak signal FM messaging system)
PSKMail (Linux): <http://pskmail.wikispaces.com/> (Message Software)
Quickmix: www.ptpart.co.uk/quickmix/ (Store and recall different sets of mixer settings for each program you use)
W4MQ Internet Remote Base: www.w4mq.com/

Section G – Ham Software and Information Sites

AC6V's Amateur Radio and DX Reference Guide: www.ac6v.com/
AC6V Software Page: <http://ac6v.com/software.htm#DIGITAL>
Amateur Radio Shareware and Info Files: www.qrz.com/files.html
Amateur Radio Soundblaster Software Collection (by Dr. Oliver Welp, DL9QJ): www.muenster.de/~welp/sb.htm
Description of digital modes/protocols in MultiPSK by F6CTE: http://f1ult.free.fr/DIGIMODES/MULTIPSK/digimodesF6CTE_en.htm
JT65a Bozo Guide: www.obriensweb.com/bozoguidejt65a.htm
MM HamSoft: <http://mmhamsoft.amateur-radio.ca/>
MT's Mike Chace-Ortiz UMC Software Page: www.chace-ortiz.org/umc/software.html
Soft and Hard PSK31: <http://aintel.bi.ehu.es/software.html>
The World of Fuzzy and Digital Modes: www.qsl.net/zl1bpu/
VK3HJQ SSTV Page: <http://au.geocities.com/vk3hjq/vk3hjq/sstv.htm>
Worldwide Radio Facsimile and SSTV: www.hffax.de/

Note: If you know of some software we missed that's worth a mention, or have any updates, please contact the author of this article at larryvan-horn@monitoringtimes.com

New Jersey's South Counties Emergency Radio Network

By Bill Cole, N2CSA

A *mateur Radio for the 21st Century* is a slogan Icom uses to describe their D-Star digital system. That slogan has come to define the effort of a group of Southern New Jersey hams who are building an emergency network based on D-Star technology.

This story begins in the spring of 2005 with the "Operation Atlantic Surge" emergency exercise in Cape May County, NJ. The exercise simulated the helicopter evacuation of critical care patients from the New Jersey shore hospitals due to an impending hurricane. It was a joint effort of the New Jersey Division of Health and Senior Services (DHSS), the Southern New Jersey Regional Medical Coordination Center (MCC), and the Cape May County Office of Emergency Management.

Members of the Cape May County RACES (Radio Amateur Civil Emergency Service) and ARES (Amateur Radio Emergency Services) groups supported the exercise with backup com-

munication and Amateur Television.

In the latter stages of the exercise, the hospital personnel were told the cell phone system had failed. While the medical personnel were trying to work things out, a senior official from the DHSS noticed RACES and ARES operators communicating by radio. The question was asked, "Who are they?" The reply came, "They're the amateur radio guys." The next question was, "Where can we get some amateur radio guys?"

With that simple exchange a major amateur radio project was born.

A Cooperative Effort

Over the next two years, the DHSS and MCCs (New Jersey has five regional MCCs) worked with the various local RACES and ARES groups to equip New Jersey critical care hospitals with amateur radio capability.



Work session January 31, 2009. Repeaters were distributed.

This consisted of a state grant to the MCCs for purchasing dual band 2 meter/440 transceivers, 220 transceivers, antennas and power supplies. This equipment was distributed by the MCCs to the various county RACES/ARES groups for installation in local hospitals. Tests of the hospital installed equipment became part of regular monthly RACES/ARES test nets.

Coincidental to this effort, the South Counties Mutual Aid Group was formed. It is a consortium of RACES/ARES groups in the seven southern counties of New Jersey: Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester and Salem. The group ultimately falls under the auspices of the seven County Offices of Emergency Management.

The goal of the South Counties Group is to better coordinate RACES efforts within its geographic area which coincides with the Southern Regions of DHSS and MCC. It espouses a regional approach geared to break the barriers of county lines and maximize communication by the various RACES groups.

D-STAR

In November 2007, a group of Cape May County, New Jersey hams put their heads together and formed the Jersey Cape D-Star User Group (JCDUG) to experiment with D-Star technology. Regular readers of this magazine know that in late winter 2008, the JCDUG received a grant from Grove Enterprises and Monitoring Times consisting of three D-Star repeater modules which form the nucleus of the JCDUG's full stack D-Star repeater.

Three members of the JCDUG formed



Members of the South Counties Mutual Aid Group at the work session December 13, 2008. Inventory was taken, property stickers applied and Go-Kit equipment was issued.



Work session January 31, 2009. Participants braved 20 degree temperatures to distribute repeater equipment.

Cape May County's representation to the South Counties Mutual Aid Group. Not surprisingly, a sizable portion of discussion within the Mutual Aid Group centered on D-Star technology. When in early summer 2008 the Mutual Aid Group learned of the potential for a major grant to expand services to Southern New Jersey hospitals and specialty care centers, the engineering of a D-Star repeater network became the primary item of business at meetings.

The New Jersey Department of Health and Senior Services (DHSS) announced its grant to the Southern New Jersey Regional Medical Coordination Center (MCC) for the backup communications network in late summer 2008. A total of \$202,400.00 was provided to facilitate a network to link hospitals, specialty care centers, and long term care facilities. A proposal was submitted, and the MCC made the grant available to the South Counties Mutual Aid Group. Ultimately the network came to be called the South Counties Emergency Radio Network or SCERN.

Up to now this chronicle has been a litany of agencies, acronyms, etc. and is illustrative of the path amateurs can anticipate when participating in a project with governmental and quasi-governmental organizations. However, this project went smoothly. The New Jersey Division of Health and Senior Services, as well as Southern New Jersey Regional Medical Coordination Center, are to be acknowledged for their speed of action and cooperation.

Gearing Up

At the October meeting of the South Counties Mutual Aid Group, the initial specification for the South Counties Emergency Radio Network (SCERN) was formulated. The network initially would consist of seven main D-Star repeaters. Each main repeater includes

an ID-RPT4000V 440 slow speed data module, ID-RPT2D high speed data module, an ID-RP2C controller, 60 amp power supply, a 440 duplexer, server, server UPS, a repeater cabinet, and a tri-band antenna (1.2 gig., 440, 2 meter).

One of these repeaters would be deployed in each of New Jersey's seven southern counties. In addition, each county would receive two go-kits, consisting of an ID-800H transceiver, ID-1 transceiver, 30 amp power supply, laptop computer, antenna and triplexer, with a Pelican case for storage.

Because the D-Star high speed data repeaters are lower power, it was decided to obtain ten additional data repeaters consisting of a cabinet, ID-RP2D data module, ID-RP2C controller, power supply, server and server UPS to be placed as fill-in units where there were signal issues. Each county would receive one, with the other three held in reserve to plug gaps in the system. The plan was approved.

The equipment specification was developed because of the anticipated message traffic. Its purpose is not only to handle voice traffic, but to send data in the form of email, files, spreadsheets, NTS style messages, graphics, photos, and tracking data similar to APRS. The voice traffic and tracking data is transmitted via 440 UHF, and data, files, photos, etc. at 1.2 gigahertz.

Glaringly absent is the use of the 2 meter band, which has long held sway in emergency communication. It is absent for entirely practical purposes. The local coordinating council doesn't have seven 2 meter repeater frequency pairs available in the coverage area. The D-Star system is sufficiently flexible to enable the addition of 2 meter repeaters if circumstances should change.

Work Begins

The grant was made by DHSS to the Southern Regional MCC and the equipment was ordered. Throughout November and the first week of December 2008 equipment was received and warehoused at a secure facility. With the arrival of all the equipment, a work party was held December 13, 2008. Representatives of the South Counties Mutual Aid Group met at the storage facility to inventory, property tag, and begin distribution of equipment. Go Kits were distributed to the representatives of each county in attendance.

A second work party was held January 31, 2009, at which the representatives of each county were issued a 440 voice/high speed data repeater and a high speed data fill-in repeater. Members of the Gloucester County, NJ, contingent were most energetic and placed their 440 voice/high

speed data repeater on the air in voice mode for testing purposes, becoming the first county to put a SCERN repeater on line. At the time this article is being prepared (February 2009), the remaining six counties are awaiting installation of antennas, etc. prior to bringing their voice/high speed data repeaters on line.

The target for these repeaters to be activated is May. The date for having the repeaters linked via internet has not been established, but will probably be late summer or early fall.

Too Soon to Judge...

The work of establishing the system has just begun. So the work yet to be done includes: Go Kit laptops must have software installed, fill-in data repeaters sited, training must be scheduled, and so much more. As this project is charting new areas for amateur radio, there will be obstacles yet undiscovered to overcome. One thing is certain: the network is being built by amateurs at a bargain price.

The development of the SCERN is still in its early stages, and must be viewed as such. However, at some point its utility must be evaluated. That point is at least eighteen to twenty-four months away.

Digital communication is becoming the standard for the 21st century, not only for amateur radio, but also public service, television, cell phones and other communications. At this time D-Star is the major player in amateur digital. Currently, there are nearly 400 D-Star repeaters connected via the gateway world wide. These repeaters are being used by over 7200 registered users.

If your interest in D-Star has been piqued, there is much to learn about the system. The best single source we recommend for developing this knowledge is the **ARRL's VHF Digital Handbook** by Steve Ford, WB8IMY.

This article has chronicled the development of the SCERN amateur network from concept to the first D-Star repeater being tested. There is much yet to do in turning the equipment into a fully functioning emergency network. We hope to make a further report in *Monitoring Times* when the system is fully operational.

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Work session January 31, 2009. South Counties Mutual Aid Group representatives from Gloucester County, NJ programming an ID-RPT4000V repeater module.

Ten Reasons to Get Your Amateur Radio License

By Skip Arey N2EI

In case you don't read *Monitoring Times* cover to cover (Why not?), allow me to introduce myself. I am Skip Arey N2EI. The callsign is as important to me as my name. I have been a licensed amateur radio operator since 1976. I have practiced the ham radio art every day of my life since that first little yellow piece of paper from the Federal Communications Commission showed up in my mail box all those years ago.

If you have read any of my columns in *MT* or other places, you know that I am constantly trying to get folks to join me in this part of the radio hobby. Well, this month I'm taking even more space in the magazine to push just a little bit harder to convince some of you readers to join me in all the fun that ham radio has to offer. Read on, you won't be disappointed.

1. IT'S EASY

It's easier than ever, actually. Amateur radio does have rules and various licenses that convey levels of access to frequency and modes. Over the years, the entry level process has changed to make the hobby more accessible. For one thing, the mandatory requirement to master Morse Code was dropped on February 23, 2007. That has put aside a major barrier for some applicants.

The entry level Technician Class ticket now only requires that you pass Element 2 of the FCC Exam structure. All you need to do is pass a 35 question multiple choice test (you need to get 26 right answers) to get full privileges to all amateur radio frequencies above 30 MHz and some limited access to HF frequencies using CW in portions of the 80, 40 and 15 meter bands. You also get limited phone and RTTY in addition to CW on the 10 meter band. Not too shabby for a couple of evenings of study and an hour or so at a VE examination site.

VE stands for Volunteer Examiner. Hams were once required to take their tests at FCC Field Offices. Now you can usually find a location near your home with local hams running the test sessions.

Here are two Web sites to start you down the road: www.radioexam.org/ gives a great overview of the process for going after your first ham ticket, as does the American Radio Relay League website for beginners at www.hello-radio.org/

2. ALL ARE WELCOME

Folks as young as 6 years old have joined the ranks of amateur radio. There are also people on the air today who were around in those early days when ALL radio was amateur radio. Obviously age is no barrier. Nor is sex, race, religion, physical disability or just about any other perceived barrier. All that is required is a willingness to follow the steps through the license process and a promise to play by the rules when you get on the air.

If you choose to use CW as your primary mode of communication, you really have no way to make any judgments about the ham on the other end of the conversation. Just the power of their signal and the quality of their keying is all you can know unless otherwise told. You could have a QSO with a ham who is both blind and hearing impaired, and who detects your signal by putting their fingers on the cone of their receiver's speaker. Ham radio is one of the most inclusive hobbies in the world today.

3. MEET NEW PEOPLE

Because of Number 2 above, you will get to meet folks from literally every walk of life. You are as likely to find yourself in communication with a factory worker as a corporate CEO; a social worker as a military general; a stay at home mom as a nationally known musician. Personally, I have chatted on the air with a national TV personality, a professional football player, an astronaut, a pilot for the Goodyear Blimp, several politicians, and more than a few well known computer professionals.

What did we talk about? Ham radio! We had the same sort of conversation that I would have just as happily with a steel worker, a retired telephone lineman, a student, or a school teacher. The main point to remember is that we are all hams and we all have a lot to talk about. I have learned about new ideas, new hobbies, new places to visit on vacation – all through QSOs with folks from around the country and the world.

Most importantly, I learned that hams are a lot alike, no matter what they do for a living or where they live. The rest of the world could learn a thing or two from the camaraderie and fellowship that hams share with one another.

4. TRAVEL AROUND THE WORLD (AND BEYOND)

Well, sort of. You can send your signal to any place on the planet and share in a conversation with a ham there. I have only crossed outside the borders of the United States a few times, but my radio signal has traveled to nearly 200 other countries so far. If there are people anywhere in the world, there are hams. There are a few notable exceptions, due to current political climates, but even these situations change if you hang around ham radio long enough.



Hams also go to places where there no hams because there are no people, in order to make that place in the world available to hams everywhere. Recently a group of hams activated Desecheo Island, a small place not too far from Puerto Rico. This island is uninhabited and is designated a nature preserve. Until this most recent DXpedition, it was one of the rarest amateur radio contacts you could find. The hams that were given brief access to the island made contact with over one hundred thousand stations around the world.

And you are not limited to talking to remote places on earth. The International Space Station (ISS) has a fully equipped ham station that is activated regularly by astronaut hams. This really is a hobby that is out of this world.

5. YOU CAN BUILD YOUR OWN RADIO GEAR

While this might not be everyone's cup of tea, for many hams this is the biggest kick of all. If you look at the manual for any piece of commercially produced radio equipment, you will see that the device had to undergo extensive testing and approval before the FCC allowed it to be sold.



Hams, on the other hand, have the unique privilege of being allowed to experiment, modify, design, and build their own transmitters, receivers, and accessories without going through this complicated process. Of course you have to adhere to good radio practice and make sure your signals are clean and within the allocated bands. But beyond that, have at it!

Many innovations in radio communication have come about through the experimental efforts of the amateur radio community. In addition to building and modifying your operating gear, many hams enjoy experimenting with antenna designs to try to improve the ability to send and receive more efficiently. Some hams also try to make their stations "green" by working with alternative power sources such as solar power. As long as you abide by the rules and regulations that apply to amateur radio operation, you are not only welcome, but you are encouraged to develop and advance the radio art.

6. GO MOBILE OR PORTABLE

Unlike commercial radio stations, you can usually take your ham station anywhere you want to go within the geographic limits of the country issuing your license. With reciprocal licensing agreements, you can even operate outside of your native land. (That's how DXpeditions do their thing.)

Many hams have VHF/UHF gear in their car to help their daily commute go by faster and also to provide support for public service entities in times of emergency. But you can also pack up some HF gear and head off into the woods, string a piece of wire up in a tree, and enjoy amateur radio



while camping, canoeing, bicycling or almost any other outdoor hobby. Taking ham radio on the road is just one more reason to join in all the fun.

7. PREPARE FOR A NEW CAREER

Amateur radio can be a pathway to both employment and promotion. Personally, my ham license played a role in no less than four job opportunities throughout my adult life. And you might be surprised to learn that only two of those jobs were technical in nature. Being a ham is a way of demonstrating to an employer that that you have a certain level of self discipline, an ability to communicate, and the capability to understand and follow rules and regulations. All of these skills are of value to an employer.

Now, couple that with verifiable proof that you possess, at minimum, a basic understanding of radio electronics and it is easy to see how a ham radio background can open more than a few doors for you.

I am currently employed in technical support for a state government agency. At my initial interview for this job, when asked about my technical expertise, I reached into my pocket and pulled out a 20 meter transceiver I built into an Altoids™ mint tin. I was hired on the spot.

8. COMPETE IN CONTESTS AND ACHIEVE AWARDS

If you have a competitive nature, I dare you to find anything more challenging and fun than a worldwide amateur radio contest. When you are out there trying to earn points toward your final score, you are not just competing against other hams, you are challenged by the limitations of your equipment and the propagation conditions that Mother Nature throws your way in the form of solar activity (or lack thereof) and atmospheric conditions. Perseverance and skill can often trump higher power and better equipment.

Ham contests can be big world wide week-end affairs or short little local "sprints." Some are nationally and internationally organized, some are state or club based activities. All of them are fun. Even if you post a score that is less than competitive, you can add a lot of stations to your logs that will help you achieve many of the awards that amateur radio has to offer.

Most hams have a few sheets of "wallpaper" hanging in their shacks. It may be one of the basic operating awards such as Worked All States (WAS) or The DX Century Club (DXCC) awarded for working 100 countries. But literally dozens of other awards are out there to challenge your operating skills and abilities.

9. SERVE YOUR COMMUNITY

Hams have always had a great sense of public service. We are granted access to the frequencies we have, to some degree, with an understanding that we will serve to assist other public service entities in times of trouble. Through organizations like The Amateur Radio Emergency Service (ARES), The Radio Amateur Civil Emergency Service (RACES), SkyWarn and the Military

Amateur Radio Service (MARS), hams stand ready to provide communications assistance in times of local and national disaster. Any time you hear of trouble somewhere in the country or even in the world, you will usually hear that hams have answered the call as well, providing services such as health and welfare communications in regions where phone service or power have been knocked out by natural or manmade causes. As a licensed amateur radio operator, you can become involved in this essential public service.



10. HAVE FUN

Folks often ask me what has kept me interested in this hobby for over 30 years. Everything said up to this point probably has had something to do with my continued participation, but more than anything, I have had tons of fun! There are very few things in amateur radio that do not bring a smile to my face. I have learned about the world. I have built radios. I have pushed the limits of my understanding of electronics. I have served my community. I have earned awards and won contests. But all of this, and anything else I may not have thought of, is secondary to just sitting down to my station on any evening, dialing through the bands, and answering a CQ from another ham somewhere in the world.

As I say at the end of my regular column every month: I'll see you on the bottom end of 40 meters.

MT

NASB National Association of Shortwave Broadcasters

Representing the privately-owned
shortwave stations in the USA

- Find links to all of our members at www.shortwave.org
- Subscribe to our free Newsletter: nasbmem@rocketmail.com
- Listen to "The Voice of the NASB" on the third Saturday of each month on HCJB's DX Party Line: 12 midnight Eastern Time on 9955 kHz
- Come to our next annual meeting May 7-8, 2009 in Nashville, TN.
- More info at www.shortwave.org/meeting.htm

NASB is a member of the
HFCC (High Frequency
Coordination Conference)
and the DRM (Digital Radio
Mondiale) Consortium

Amateur Radio: A Fantastic Lifetime Hobby

By Arthur R. Lee WF6P

In these days of instant internet world-wide communications such as YouTube, Facebook and MySpace, some of the mystique of ham radio has quietly slipped from public interest. Nearly everyone can be seen talking, driving or walking while on a cell phone. This is all too true. However, let us examine the differences and explore what ham radio offers that internet or telephone communications do not.

Stepping Stone to Further Study

First, ham radio is not simply communications. There are rules and regulations governing these communications as well as the requirement for a government license to operate. Thus, there is some built-in responsibility on the part of the ham operator. The attainment of the FCC license requires a certain amount of study much beyond the maneuvering of a mouse and punching keys on a laptop keyboard.

While the thought of acquiring technical studies may not appeal to some, thousands of others have catapulted those studies into much needed engineering or other degrees vital to the health of industry. Some young amateurs who struggled with the learning of Morse Code (now no longer required) and the



The author at home in his ham shack.

intricacies of the tiers of licensing have gone on to become leaders in the world of computer science or space travel. One notable person in this regard is Dr. Michael D. Griffin, now the Administrator of NASA and in charge of Lunar and Mars landings. Another is Dr. Jill Tarter, Astronomer and SETI director. (The movie *Contact*, starring Jody Foster, was loosely based on her early life.)

Other hams of note are Chet Atkins, Marlon Brando, Barry Goldwater and Country singer Patty Loveless. A more complete list of other famous hams can be found at http://users.tellurian.com/gjurrens/famous_hams.html

I first became interested in ham radio as a young boy watching WWII movies where soldiers in battle and sailors on ships pounded out desperate messages on telegraph keys. Then there was the gripping story of the sinking *Titanic* in iceberg waters as radio operators begged for help. Imagine, sending messages over the air without wires!

In high school I signed up in a Radio Shop class where I could build radios that miraculously transformed a pile of tubes, resistors, capacitors and parts into something that received signals through space. It was magic, and far better and longer-range than the little crystal set and earphones I had at my bedside at home. This led me to an introduction to electronics as

a technician in the Navy. While not interested in servicing shipboard RADAR at the time, my attraction to radio communications never waned. With much enthusiasm, I tackled the process of learning what I needed to know to acquire this goal.

Life-long Friends

As a recreational sailor and later, an RV enthusiast, being able to communicate with other ham friends was highly enjoyable. Imagine being on a sailboat at sea for a week or two and having a nightly conversation with one's wife and family ashore; or talking to Tahiti-bound friends aboard their boat. Or, being on a cross-country trip or two and setting up your rig at night and chatting with friends and relatives while at a National Park or RV site. Ham radio operators continuously meet and make many world-wide friends. When propagation is favorable, contacts with new friends in foreign lands, on ships, in airplanes or on far away desert islands is a thrill.



A typical ham club meeting (held at the Education Center, Dominican Hospital).

The enjoyment is doubled when the occasion arises after many years to have a face-to-face meeting. Once, a scientist ham I had contacted on Macquarie Island off the coast of Antarctica, came knocking at my door for a visit. My wife and I met a Morse code pal when we passed through his state of Arkansas. In Honolulu we had lunch at the home of a ham friend, a retired Marine Colonel fighter pilot who was Net Manager for the 15 Meter Pacific Maritime Mobile Net. He kept track



The author, checking club HF equipment in the K6BJ repeater shack.

of sailboats cruising the Pacific and Indian Oceans. He and his wife paid us a return visit.

The licensing process is a pretty good guarantee that the person you are contacting is a serious and trustworthy person. In the good old USA, making friends across the country can result in some great and lasting friendships. As a ham radio instructor, I used to tell my students that if ever they were in trouble on the road, seek out a home with a ham antenna for help.

The Thrill of Construction

An integral part of the hobby is the assembling of a radio station. As United States hams, we have the privilege of building and operating our own transmitters and receivers. This is certainly not true in all countries.

Putting together one's own radio is highly enjoyable and satisfying. Most hams buy commercially built radios (rigs) either new or on the used market. The prices have dropped dramatically in the past years. Hams often loan their spare equipment to help novice hams get started. Club stations may have rigs available for use of members who have no high frequency equipment of their own.

These days, high quality kits are available on the market, allowing us to learn while we assemble. We can still build our own designs from scratch if one has the desire, time, and wish to further their own knowledge. Hams have always been innovative along those lines, perhaps struggling with a design or searching for parts.

Plans for various radio projects are available in most public libraries and often found within the pages of this or other electronics magazines. In the early years, **Popular Mechanics** and **Popular Science** carried such material. Single or multiple tube type Morse Code transmitters were very popular in the 1930s and '40s.

Building antennas is another challenging endeavor and the best and least costly way to enhance one's transmission and receiving signals. Some beam antennas can be complicated and expensive; however, even simple, low-cost dipoles strung between two trees can work just fine.

Service during Emergencies

Ham radio has a serious side to it. Amateur radio operators come to the fore during emergencies in any country in times of disaster. In actuality, they are nearly always the only source of immediate communications. Cell towers fail and telephone and power lines fall down. A part of the pride of being a member of the Amateur Radio Emergency Services (ARES) is being prepared and ready to respond. Most have emergency power supplies in the form of charged storage batteries or portable gasoline driven generators.

In the event of earthquakes, tsunamis or other natural disasters, ham radio operators get on the air to assist police, fire and local authorities with emergency communication



Ham clubs often have interesting speakers bringing technical information to meetings. Donald Kerns, AE6RF, computer software engineer, addresses the group on antenna design.

needs. During the flood of 1982 in the county of Santa Cruz, California, a swollen river took away all phone and power cables from beneath a bridge.

In the earthquake of 1989, county communications were out for nearly a week. Ham radio operators performed communications duties in emergency shelters as well as in the County Emergency Command Center. Sitting in the basement Command Center on twelve hour shifts was a bit nerve wracking when the five story concrete structure of the building above shook like a bowl of jelly at each new aftershock. Calls from the county to the State Capitol for National Guard assistance was done only through the ham radio operators on duty. Water trucks, fuel trucks, firewood, food and medical supplies were sent. In one isolated backwoods community, a request for 80 cords of firewood was met. This community with over 100 families had been cut off by a mudslide covering the only road in or out. They were discovered three days later by a ham in a four-wheel drive jeep.

A Great Equalizer

Within the ranks of the Santa Cruz Amateur Radio club can be found medical doctors, engineers, aviators, artists, lawyers, retired military personnel and teachers. One ham was administered a license exam on a Saturday by a Volunteer Examiner (VE), then had his appendix removed on Monday by the same person, a surgeon.

Not to be excluded as communications heroes are youthful, newly licensed amateurs who are the enthusiastic leaders of the future. Often, these members are key players when emergencies arise. In the 1989 Loma Prieta earthquake, many of our amateur radio operators standing communications watches were newly licensed or had not yet received their licenses. Under the control of licensed operators, this is permitted. My son, Randal, a Navy flight navigator in P3 aircraft, was available and participated. He was the link between the Santa Cruz County and Sacramento emergency centers. At the time, he was awaiting the arrival of his amateur license, N6UZI.

The hobby of ham radio can be exciting and entertaining. Many hams are retired or have disabilities preventing them from leaving their homes. Local hams often help with their needs such as mentoring, equipment repair, or putting up antennas. Ham club social activities such as lunches, coffees and parties help bring them together.

If you have a desire to become an amateur radio operator, contact your local library, Chamber of Commerce, or city officials for information as to the location of your local ham club. Study materials and licensing information is available from the American Radio Relay League at 225 Main Street, Newington, Connecticut 06111-1494 or www.arrl.org

MT



Meeting every other Saturday for coffee and breakfast at a local coffee shop, hams chat about equipment, tech developments and offer good-natured trivia.



Frequency Coordination in the Amateur Radio Service

By Wayne Heinen N0POH

When it comes to doling out the spectrum in the United States, there are two major players: the Federal Communications Commission (FCC) and the National Telecommunications and Information Administration (NTIA). The FCC handles the allocation and licensing of the various services including governmental (except Federal Government), commercial and amateur services. The NTIA through its Office of Spectrum Management (OSM) is responsible for managing the Federal Government's use of the radio frequency spectrum. It all works well on paper until you look at the portions of the spectrum where the Amateur Radio Service operates.

Each licensed Amateur (ham) has the privileges to operate in the portions of the Amateur bands allowed by his license class, using the modes that are available in the assigned segments. This works well on the HF (shortwave) bands where the operation is simplex (station to station). Most hams are able to amicably work out operations on the crowded ham bands and the misfits get to deal with the FCC if they get too rowdy.

What about the spectrum on VHF and above, where much of the operating is done using amateur radio repeaters that, by their very nature, use a fixed input and fixed output frequency? You can't have each of the thousands of amateur operators setting up repeaters anywhere in the spectrum assigned to the amateur licensees without causing massive interference and making the bands totally useless! This is where the Frequency Coordinators come in.

What's a Frequency Coordinator?

The Amateur Radio community has a nationwide organization, the American Radio Relay League (ARRL). However, quoting from the ARRL's repeater directory: "*The ARRL is not a Frequency Coordinator, nor does the ARRL 'certify' coordinators. Frequency Coordinators are volunteers normally appointed by a coordinating body. The ARRL reports only the fact of coordination or non-coordination as instructed by the coordinating body. Publication of coordinator information by the ARRL does not constitute nor*

imply endorsement or recognition of the authority of such coordinators, as coordinators derive their authority from the voluntary participation of the entire amateur community in the areas they serve. Frequency Coordinators keep extensive records of repeater input, output and control frequencies, including those not published in directories (at the owner's request). The coordinator will recommend frequencies for a proposed repeater in order to minimize interference with other repeaters and simplex operations. Therefore, anyone considering the installation of a repeater should check with the local frequency coordinator prior to such installation."

Who are these Frequency Coordinators and how did they come to be? Frequency coordination, like other activities in ham radio, is the duty of volunteers. There are various coordination bodies that are made up of representatives from clubs that sponsor repeaters within a region, as well as private repeater owners who have invested their time and money in setting up repeaters.

Many frequency coordination bodies are regional or statewide. They usually use a committee comprised of officers and members of the group whose purpose is to entertain requests by individuals wishing to set up amateur installations using fixed frequencies in the bands above 29 MHz. Coordinated activities are voice repeaters (both analog and digital), ATV repeaters, and auxiliary frequencies. This is done with the objective of preventing or reducing potential interference to existing systems, and to provide appropriate frequencies to new systems for the enjoyment of their users.

The Task of Coordination

The coordinating body within the region establishes the parameters within the given amateur bands, taking into account the channel spacing of the input and output frequencies to be used. This limits the number of available frequency pairs within a region based on the spacing between the output frequencies.

In addition, there needs to be physical distance between repeater assignments so that there is no adjacent channel interference from one repeater system to another on their output frequencies. Repeater assignments on the same frequency pairs must also be physically spaced at a distance that is far enough apart to prevent co-channel interference. These parameters apply to normal propagation conditions. In the event of tropospheric ducting, E layer skip and other DX enhancing propagation, no system is immune from interference, but these are

unusual circumstances.

An applicant for a new repeater system must do their best to request a frequency pair that will meet all of the requirements designed to prevent interference to any existing coordinated system. The applicant must supply the proposed location and height of the system, its expected power output, antenna gain and pattern, and other pertinent data with their application. The frequency coordinator's job is to review the operating parameters of all of the existing coordinated repeaters within their area and the areas surrounding their jurisdiction to make sure that no new repeater system that they coordinate will cause interference to any other existing coordinated repeater.

After the frequency coordinator has considered the technical information of that system and of others on the same and adjacent frequencies, the end result is the issuance of a coordinated frequency pair being assigned to the new amateur radio repeater system.

Frequency Coordinators have no legal authority. The Federal Communications Commission regards their efforts very highly and in matters of conflict between interfering repeaters, the coordinated operation is considered legitimate and the onus of correcting any interference falls on the non-coordinated operation.

Local Band Plans

Another aspect of frequency coordination is the creation and publication of localized band plans. Many areas develop their own jurisdictional band plans to better serve the amateur operators within their area. These band plans may delineate the areas that are for use by weak signal simplex operations, FM simplex operation, digital operations and the like. In so doing, the frequency coordinator attempts to make the best use of the assigned spectrum for all the operators within the individual VHF, UHF, and microwave bands.

The National Frequency Coordinators' Council, Inc. (NFCC) maintains a web site at www.arrl.org/nfcc/coordinators.htm that lists all of the recognized coordination bodies within the United States and its Territories. The NFCC has a set of Certification Standards that any NFCC Certified coordination body needs to meet in order to become certified by the NFCC. Their Certification Standards are also at their website.

To obtain more information on the coordination body in your area, just visit the NFCC's page and you can look up the organization that handles the frequency coordination in your area.

Note: Wayne Heinen is the Treasurer of the Colorado Council of Amateur Radio Clubs which is the coordinating body for the State of Colorado



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Note: Frequencies in bold indicates spectrum coordinated by the CCARC.

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25,000-512,000 MHz., 764,000-775,987.5 MHz., 794,000-823,987.5 MHz., 849,012-868,987.5 MHz., 894,012-956,000 MHz., 1,240,000 MHz.-1,300,000 MHz.

The handheld BCD396T scanner was designed for National Security/Emergency Preparedness (NS/EP) and homeland security use with new features such as **Fire Tone Out Decoder**. This feature lets you set the BCD396T to alert if your selected two-tone sequential paging tones are received. Ideal for on-call firefighters, emergency response staff and for activating individual scanners used for incident management and population attack warning.

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Bearcat® BC246T Trunk Tracker III

Suggested list price \$399.95/CEI price \$214.95

Compact professional handheld TrunkTracker III scanner featuring Close Call and Dynamically Allocated Channel Memory (up to 2,500 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging. Size: 2.72" Wide x 1.26" Deep x 4.6" High

Frequency Coverage:

25,000-54,000 MHz., 108,000-174,000 MHz., 216,000-224,980 MHz., 400,000-512,000 MHz., 806,000-823,987.5 MHz., 849,012-868,987.5 MHz., 894,012-956,000 MHz., 1,240,000 MHz.-1,300,000 MHz.

The handheld BC246T TrunkTracker scanner has so many features, we recommend you visit our web site at www.usascan.com and download the free owner's manual. Popular features include **Close Call Radio Frequency Capture** - Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. **Dynamically Allocated Channel Memory** - Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 1,600 channels are typical but **over 2,500 channels are possible** depending on the scanner features used. You can also easily determine how much memory is used. **Preprogrammed Service Search (10)**

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How to Jump Start Your New Ham Radio Hobby

Men and women come to ham radio from every walk of life, all ages and every cultural background. Radio has a certain pull that entices us all.

Getting your entry-level ham license is the critical move that takes you from listening to participating, but what happens next? Jumping into the ham radio pool can be intimidating, particularly for younger hams and women of all ages who may feel uncomfortable in a hobby dominated by men whose average age is over 55.

This month the *Beginner's Corner* explores different ways for new hams to enjoy this great hobby: No Experience Required.

❖ Join the Public Service

The ranks of new hams have swelled over the last few years following the FCC's decision to drop the Morse code requirement for all license levels. Many are coming to the hobby because they've been inspired by news reports of local hams diving into the breach created by natural disasters when the commercial communications infrastructure is rendered useless.

All areas of the U.S. in the last few years have been blasted by severe weather: hurricanes in the south, fires and floods in the west, ice storms in the north and tornadoes in between. Across America organized teams of hams have taken to the coasts, highways and back roads to aid local public services. They've provided much needed backup communications to police, fire and rescue, transportation departments, medical facilities and Red Cross across the land, and they have earned the praise and commendation of all.

Sometimes you don't need any expertise at all to be useful. Just having a Technician Class license and a four wheel drive vehicle can make you a valuable asset in your community. All you have to do is volunteer your services. There are more than 2,100 clubs affiliated with the American Radio Relay League, and the League has links to local clubs in your area. You can find them here: www.arrl.org/FandES/field/club/clubsearch.phtml.

❖ Be Weather Wise

Since weather is one of the main things that bring hams to the rescue, you may also want to beef up your weather skills. The National Weather Service (NWS) has recognized the need to recruit hams and they have a ham radio page that links to NWS sponsored programs such as SkyWarn (the original weather spotter program that aids

the NWS), MAROB (an experimental voluntary marine observation program), and CWOP (Citizen Weather Observer Program).

You can find out when SkyWarn training is happening in your area by following the links on this page: www.weather.gov/om/marine/ham.htm. Years ago I took the SkyWarn course and since then I've been able to report "ground truth" observations whenever bad weather threatens our area. I've even received calls from the NWS wanting details when radar indicated that something was happening here. The NWS now also offers advanced spotter training and e-spotter filing for SkyWarn trained spotters.

❖ Contesting

The practice of contesting may seem a nuisance niche in ham radio, but contesting helps hams develop rapid on-air instincts that can simulate the pressure of emergency operations. Contests also let participants train in the contest environment in all modes: Single Side Band (SSB), Morse code (CW), and the many digital modes such as BPSK31 and RTTY. The emphasis in contesting is speed and accuracy.

Many non-contest hams resent those weekends when the whole ham world participates in contests such as the ARRL's SSB or CW Sweepstakes. But, it should be a time when contesters show their abilities as participants as well as their respect for those who don't enjoy this activity. These events require that contesters be considerate operators, too, because we all have to use the same bands regardless of our activities.

The ARRL lists all of their sponsored contests on their home page. *CQ* magazine also sponsors a number of annual contests which are found on their main web page: www.cq-amateur-radio.com. There are many more contests besides these, so, to keep on top of this month's contests, look to this web site www.contesting.com which tracks them all. Or, check page 61 for a starter list.

A by-product of contesting is that participants soon rack up significant numbers of countries, counties, states, continents and grid squares that

can be converted into enough wall paper to look impressive, even to people who don't know anything about ham radio. Both the ARRL and *CQ* magazine offer many awards, and you can learn all about them on each of the above web pages.

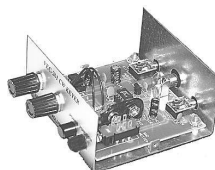
While I'm not a tester, I do participate in two events each year: ARRL Field Day (held the last full weekend in June) and School Club Round-up (held in October and February each year). Both offer particular opportunities for hams of all skills and interests. School Club Round-up is a way for the rest of us to encourage the next generation of operators (see *MT Beginner's Corner* February 2009). Field Day is your chance to see how well you can put a signal on the air at short notice and be heard. You can do it on your own, with a group of other hams, or with a club. The practice pays off, as I found out several years ago when our phones and power were out for days, thanks to the remnants of a bad tropical storm.

❖ DX Chasing

There are currently 338 DXCC entities listed on the official DXCC list (www.arrl.org/awards/dxcc) and you should know from the outset that chasing DX is a virus all its own. Many hams go their entire lives without obsessing about what countries they've worked, which ones they haven't, what new DX entities have been added, and which old ones have been deleted. But, when the DX bug hits, it usually hits hard. In the *Beginner's Corner* of September 2008, "*Coping with DXCC Fever*," I detail all the ins and outs of this part of the hobby from the beginner's perspective.

As mentioned above, a quick way to achieve DXCC (worked and confirmed at least 100 DXCC entities) is by participating in contesting. But, many of us aren't interested in contesting, so we have to pick up the DX where and when we find it. Regardless of how you work the DX, you'll need to know how to confirm the contacts you've made.

There are strict rules about what counts as an authentic QSL. Old fashioned paper QSL cards are always accepted, though e-QSLs (those sent via e-mail) are not. Electronic QSLs on the ARRL sponsored *Logbook of the World* (www.arrl.org/lotw) are accepted and are the fastest way to DXCC. However, many hams, particularly those in the more exotic DXCC countries, do not participate in the LOTW program, so you're stuck with trying for a paper QSL. If the DX contact uses a QSL manager in the U.S., it will cost only the price of postage each way, your own QSL card, and a self-addressed stamped envelope (SASE);



This electronic keyer will improve your construction skills and, when it's done, your CW skills. It's from Vectronics and sells for \$24.95 (shipping and case extra). (Courtesy: Vectronics)

don't forget to put on the return postage.

If the DX contact uses a QSL manager overseas, in Europe for instance, you'll need to send your QSL with a self-addressed envelope and enough money (known as "green stamps," usually \$2) for the return postage. Some QSL managers accept International Reply Coupons (IRCs); others don't. Some require \$3 for return postage. As you can see, if you had to QSL via foreign QSL managers, you could spend between \$200 and \$300 for the privilege of confirming just 100 DXCC entities. Remember, there are 338!

The cheapest but by far the slowest way to QSL is through the QSL Bureau. Most amateur radio organizations in most DXCC countries participate in a voluntary QSL bureau program that allows you to send your QSL cards in batches to your out-going QSL bureau, where they are eventually handed off to the country of the ham you're trying to QSL. That country, when it finally receives those cards destined for it, then hands it off to the various regional bureaus, where it is eventually put in an envelope of the ham to whom it's been sent. After a few months, when a certain number of cards have accumulated in the envelope, the envelope is sealed up and sent to the ham's address.

Once in the DX contact's hands, it goes through the same process in reverse to get back to you. Depending on the country (most European



Ever worked the digital modes? They're not hard and you can get started for free! Easily downloadable software and a few inexpensive audio cables let you work the world via Slow Scan TV (SSTV), BPSK31 or RTTY. (Courtesy: Author)

countries have very fast QSL bureaus), it can take a few weeks or a few years before your contact is confirmed. I recently received a QSL from an operator in Chile for a contact I made more than four years ago. In the pursuit of DXCC, patience is not just a virtue, it's a necessity.

Details of how the QSL bureau works are found here: www.arrrl.org/qs/qsline.html. You do not need to be an ARRL member to receive QSLs via the in-coming bureau. You do have to be a member to send QSL cards through the out-going bureau.

❖ Change Your Modus Operandi

Too many hams get stuck in one mode or another, get comfortable, and never leave. The decades drag by and they're right where they started. Inertia is a tough thing to overcome, but once you do, the rewards are great. If you're stuck in "mode rut" here are some suggestions for blasting your way out:

Take on a new prospective ham. Being a teacher (known as an "Elmer") is a great way to learn even more about what you're doing, because having to explain everything you do forces you to have a deeper understanding of what it is you're doing. The new ham can be a friend or colleague

at work, a neighbor, a relative, a kid next door or a grandchild. Make a weekly date for ham studies and move the studies along; don't stagnate, but move at the student's abilities. Always give encouragement. Be generous. Give away some of your gear to someone who wants to be a ham but can't afford the gear.

Look at your own operating habits. Do you spend most of your time on 2 meters or 80 meter phone yakking with buddies? That's fine, but you're missing out on all the rest. Try a new digital mode such as BPSK31 or an older one such as RTTY. Operating these modes cost little or no money and they are very easy to learn. I call it the stealth mode of hamming, because you can operate silently in the house without disturbing anyone.

Even though CW is no longer required, it's still a great skill to know. If you've never tried it, give it a shot. Don't worry about not being a high-speed operator: most hams will slow down to your level and, like everything else, the more you practice the better you'll get.

Build something! There are many books in print that can give you a lifetime of building projects. A good place to start is with antennas, or you can build a simple CW QRP (low power) transmitter from scratch, or build a commercial kit such as one from www.vectronics.com. There are inexpensive kits available for all skill levels here and at many other web sites. Look around.

And, finally, upgrade your license. With ARRL or similar study guides and on-line testing practice, there's just no excuse for not upgrading to the next higher license grade. Let me know what you're doing to grow your ham radio hobby.

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Hopping the Islands of Hawaii

By Loyd Van Horn, W4LVH

Maybe it is the distance, maybe it is the culture, or maybe it is the beauty of the islands, but the state of Hawaii has always held a strong fascination for me. But getting any exposure to Hawaiian culture has been limited to backyard luaus and reruns of Hawaii Five-O.

During my days as a mediumwave DXer, I would read loggings from my West Coast counterparts hearing traffic updates and news from the “big island,” or music from one of the smaller towns. Always, I would tune to a frequency where a Hawaiian station was located, listen to the crackle of static and sigh with disappointment that likely I would never tune in any radio signals from Hawaii.

Thank goodness the Internet came along to fill that void.

Radio has a long history in Hawaii. The first commercial signals on the islands began broadcasting in the early 1920s, and during the time of World War II, radio was bringing updates on the war and news from the continental U.S. to a largely American military audience.

Many of Hawaii’s bigger stations are on the “Big Island” with an eclectic mix of stations scattered about the other islands.

Surprisingly, there aren’t many stations streaming their signals; even some of the bigger stations haven’t jumped on the streaming bandwagon. But what can be found makes for some highly interesting listening.

My first stop on my tour of Hawaii was KTUH – 90.3 FM at the University of Hawaii in Honolulu. I usually like to start by listening to the college radio stations in a particular area, as it gives me a pretty eclectic viewpoint of the area. On the evening I was listening to “Hawaii’s only alternative,” it was reggae time, including some reggae covers of popular songs that were quite entertaining (Radiohead fans would have loved the reggae version of “Karma Police”). There was something very fitting and relaxing about listening to the tropical sounds of reggae emanating from a station that was located in Hawaii. As it turned out, it would not be the last time that I would come across reggae in my Hawaiian radio search.

Another varied mix of music can be found at



Menao Radio – KEAO 91.5 FM in Wailuku, Maui. The night I was listening, a steady stream of blues was being played, but the Menao Radio program schedule on their Web site promises everything under the sun, including traditional Hawaiian music from the territorial days. And yes, more reggae.

My next usual stop on a radio tour of an area will be to one of their main news/talk radio stations to get a glimpse at things like traffic updates, local talk, news and local commercials. I came across a local television’s news simulcast from KHNR – 690 AM on the island of Oahu. During my listening session, the big story dealt with people having problems breathing from volcanic emissions, along with local commercials for solar power providers.

For those looking for an authentic flavor of the islands, Hawaiian music abounds at KAPA 100.3/93.1 FM. In addition to the distinctive island feel to the music on KAPA, expect a tremendous helping of local flair from the on-air staff. Try the “Aloha Morning Show” with Paka Boy and Jaz or the “Paauhana Drive” with Braddah Moks from 3 to 7 p.m. each weekday.

More traditional Hawaiian music and reggae can be found at Island 98.5 – KDNN FM. Shows like the “Reggae Cafe” are a spotlight attraction in the Island 98.5 programming schedule, and on-air personalities with names like Mento Mele and Phat Joe provide a glimpse into Hawaiian life guaranteed to give even the most casual listener the urge to start pricing airline tickets for a Hawaiian vacation.

Another great source for music from the islands is Hawaiian 105 – KINE. In addition to the stream, a guide can be found where you can find out more information about the artists featured on KINE. Or, if you are wondering how the waves are, there is a surf report as well.

Kaua’s community radio station, KKCR, plays an eclectic grab-bag of music from a



wide variety of genres with new shows coming on nearly every hour or two. During a brief listening session I heard everything from *The Who* to comedy recordings from *Prairie Home Companion*. Every weekday morning before 11 a.m. Hawaiian time, KKCR features various forms of Hawaiian music.

KPOA in Maui was the first FM radio station in Hawaii to feature Hawaiian music exclusively in its format and has been doing so ever since 1984. The music I heard during my listening session seemed to be a bit more traditional and folk oriented and much of it was in a native Hawaiian language.

In addition to these Hawaiian-themed stations, are the usual assortment of pop and contemporary music stations, all with their own distinctive Hawaiian flair. So grab your best Hawaiian shirt, open your windows wide, and turn on some great programming straight from the islands, not to mention all the reggae you could ever want.

❖ Verizon Teams Up with Clear Channel

Subscribers to Verizon Wireless’ new Verizon Hub service can now listen to streams from 14 major-market stations owned by Clear Channel Radio through their iHeartRadio service, already a popular iPhone application.

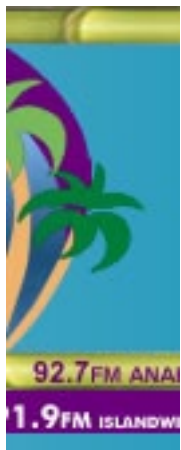
In a deal between the two media giants, the initial stations to be streamed will be based from major markets such as New York, Los Angeles, Chicago, Miami and Washington D.C. with plans to expand their station selection in the coming months.

Verizon Hub is a subscription-based service that is offered to Verizon Wireless users that is designed to be a replacement for traditional land-line service while combining many popular wireless phone features such as calendar syncing and turn-by-turn directions.

❖ The Ongoing Royalty Battle Royale

If you have been reading my column routinely the past few months, you have undoubtedly read the periodic updates on the ongoing battle between the music industry and Internet radio Webcasters. Even Congress has gotten involved in the debate, and while some compromises have been made, the real issues keeping things from being resolved are still on the table.

While the debate is full of complicated is-





sues on both sides, I will try to give you a basic understanding of the background on why this is a big deal when it comes to the future of Internet radio.

According to the Savenetradio.org Web site, the opening salvo in the royalty war began in 2007 when the overseer of music royalties, the Copyright Royalty Board, increased Internet royalty rates by some 300 to 1200 percent. Savenetradio.org points to pressure from the Recording Industry Association of America for the increase. The problem with the increase, Webcasters say, is that other forms of digital radio (namely satellite) paid substantially lower royalty rates.

This is mainly an issue for Internet-only Webcasters that provide a venue for smaller artists and recording labels. However, the implications could be felt across the industry. With a more thriving and vibrant community of Webcasters to choose from, the concept of listening to radio stations on the Internet will have a chance to achieve deeper market penetration, therefore giving even commercial station broadcast streams a chance to have a larger audience.

And even terrestrial broadcasters could soon be feeling an extra pinch when it comes to paying song royalties. Billy Corgan, founder of the rock group *Smashing Pumpkins*, recently testified before Congress that broadcast radio stations should be forced to pay performance rights to songwriters, as Internet radio stations are already doing.

Currently, compensation to artists comes through royalties paid to songwriting publishing companies such as BMI, ASCAP and SESAC, which then pay a percentage of these royalties to the artists. But this latest push by artists such as Corgan would put money from stations directly in the hands of record labels and artists. Of course, the broadcast industry, already feeling the effects of low advertising revenue from a troubled economy, feels these extra fees could cripple the industry. The recording industry, in fairness, is trying to figure out new sources of income, with sales of CDs plummeting.

As new technologies continue to revolutionize the way that musicians promote and sell their music, it is likely that debates such as these will continue to be fought. The best thing that those of us who enjoy listening to Internet radio can hope is that a compromise can be found that will keep the streams alive.

❖ Singapore Stations Pull Their Streaming Plug

The U.S. isn't the only country finding itself in a royalty tug of war.

Many radio stations in Singapore recently pulled their stream when an agreement over online royalties could not be met with Record-

ing Industry Performance Singapore (RIPS), the group that oversees music licensing for broadcasters in the Asian country.

Stations like Power 98 and 88.3JIA FM have pulled their streams until an agreement is reached between the stations' owners (MediaCorp) and RIPS. There are a few stations, such as Radio 91.3 and Radio 100.3 which are owned by SPH UnionWorks, that are still trying to hammer out agreements, so their streams are momentarily still active as of press time.

Could this be a harbinger of things to come for Internet radio? Let's hope not.

73s until next month;

GLOBALNET LINKS

KTUH – 90.3 FM - www.ktuh.org/
 KEAO – Manao Radio 91.5 FM - www.manao-radio.com/
 KHNR – 690 AM - <http://khnr.townhall.com/>
 KAPA – 100.3/93.1 FM - <http://kaparadio.com/index.php?intro=1>
 KDNN – Island 98.5 FM - www.ir985.com/main.html
 KINE – Hawaiian 105 - <http://hawaiian105.com/index.html>
 KKCR – 90.9/91.9 FM - www.kkcr.org/
 KPOA – 93.5 FM - www.kpoa.com/
 Verizon teams with Clear Channel - www.rwonline.com/article/75288
 iHeartRadio - www.iheartmusic.com/national_radio_tuner/
 Savenetradio.org - www.savenetradio.org/index.html
 Billy Corgan Testifies Before Congress - http://news.cnet.com/8301-1023_3-10192982-93.html
 Radio, Record Labels Battle Over Royalty Rates - www.pcmag.com/article2/0,2817,2342782,00.asp
 Singapore Streams Silenced - www.channelnewsasia.com/stories/singaporelocalnews/view/414489/1/.html
 Power98 - <http://power98.com.sg/>
 Radio 91.3 - www.radio913.com/



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Control Channel Scanning

Scanners have come a long way since the days of analog tuning knobs and crystals. Microprocessors and frequency synthesizers have given manufacturers the ability to produce more capable and complex products. This month we take a look at how to make use of a handy feature included in many modern scanners that can save a lot of time and effort.

❖ Bearcat 250D

Hi Dan,

I have a Bearcat BC 250D with the P-25 card in it. But I don't have the programming cable for the computer, so I am trying to program the scanner manually for the P-25 system in Philadelphia, Pennsylvania. Do you have any idea how to do this? Can it be done manually, or is it too much trouble? I have frequencies and stuff that I got off of Radio Reference. Is there any place I can go to find out how to program this scanner?

Thank you for your time.

The Bearcat 250D is a handheld scanner introduced by Uniden in late 2002. It is fully capable of tracking the three most common analog trunked radio systems, namely Motorola, EDACS (Enhanced Digital Access Communications System) and LTR (Logic Trunked Radio). With a BC125 card installed, the scanner is also capable of tracking and monitoring conventional and some trunked systems carrying APCO Project 25 digital voice traffic.

The scanner has memory for 1000 channels in 10 banks, and one channel in each bank can be assigned as a priority channel. It has a scan rate of 100 channels per second and offers frequency coverage from 25 MHz to 512 MHz, 806 MHz to 956 MHz (less cellular), and from 1240 MHz to 1.3 GHz.

There is an almost identical model called the Bearcat UBC-3300XLT, which is the equivalent of the 250D for the European market. It has similar coverage and includes the cellular bands, but only has one service search (for the VHF airband) and uses different step sizes.

As with most scanners, there are several interest groups on the Internet dedicated to the Bearcat 250D. The largest, with more than 1,500 members, can be found at groups.yahoo.com/group/UnidenBC250D/ and should be a good place to go for specific advice. Most of the activity in the group occurred in the 2003 - 2005 time frame, back when the scanner was new, but even reading the archives is educational.

The BC250D is capable of monitoring APCO

Project 25 digital activity on conventional and "traditional" trunked radio systems using the BC125D plug-in card.

❖ Project 25 Systems

APCO Project 25 voice traffic can be found in three basic kinds of systems. The first is on conventional (that is, non-trunked) frequencies. A number of public safety agencies, including the New Hampshire Department of Safety and the Los Angeles Police Department, operate P25 conventional radio systems.

The second is on trunked systems with a separate control channel running an old Motorola protocol at 3,600 bits per second (bps). These are often referred to as "3600 bps" or "3600 baud" systems. Voice traffic may be completely digital (the BC250D Owner's Manual refers to this as "Trunked at 3600") or a mixture of analog and digital activity. These "mixed mode" systems are often in the process of transitioning from analog to digital radios, but the system owners want to continue to use their existing, older analog radios in the interim.

Project 25 digital voice can also be heard on "pure" P25 trunked systems, where both voice and control channels follow Project 25 standards. A P25 control channel carries data at 9,600 bits per second, so you may see these pure systems called "9600 bps." Note that the first generation of digital-capable scanners, including the BC250D, is not able to track activity on these fully P25 networks.

❖ Computer Control and Programming

The BC250D can be programmed and remotely controlled via a connection to a personal computer. Once the appropriate software is installed and configured, it is often the easiest way to program the scanner as well as exchange frequency lists with other users.

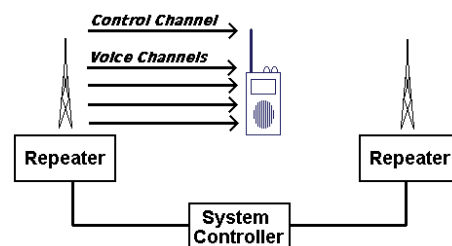
There are a number of software programs that work with the 250D, including ARC250 (\$40) from BuTel Software at www.butelsoftware.com that will allow you to program and remotely control the scanner. Uniden, the manufacturer of the scanner, offers "E-Scanner Plus" software for \$20 that you can download from their website at www.unidendirect.com.

A more complete list of both free and commercial software can be found on the Radio Reference BC250D website at wiki.radioreference.com/index.php/BC250D

❖ Control Channel Only

Motorola trunked radio systems use their allocated radio frequencies in one of two ways. Most of the frequencies are used as voice channels, to carry conversations in either analog or digital format. A much smaller number of frequencies are used as control channels, which carry digital instructions related to the operation of the system.

When a user wants to participate in a conver-



Trunked Radio System

sation, he or she pushes the talk button on the radio and waits for an acknowledgment tone. When the tone is heard, he or she begins speaking. The talk button is released when the user is finished speaking.

The control channel is used immediately before the user speaks, while a voice channel is used during the actual speech itself.

When the talk button is pushed, the radio transmits a request to the system control computer on the "inbound" control channel frequency. The request includes the identity of the radio and the talkgroup to which it is set.

When the control computer receives the request it checks the status of the voice channels in the system. If there is one that is not currently in use, the computer assigns it to the talkgroup and transmits an announcement on the "outbound" control channel. The announcement informs all of the radios listening to the control channel, including the original requesting radio, that the talkgroup is now active on a particular voice channel. The requesting radio tunes to that voice channel, emits the "go ahead and talk" tone, and begins transmitting the audio from the microphone. Other radios listening to the control channel and set to that talkgroup will also respond to the announcement by tuning to the assigned voice channel and unmuting the speaker.

For Motorola systems operating in the 800 or 900 MHz band, the voice channel assignment message includes a channel number. The radio uses this number to compute the actual radio frequency to use according to a predefined channel

plan. The radio does not need to know beforehand which voice frequencies are used in the system, since each assignment message includes all the information needed to figure it out.

The BC250D is also able to figure out voice frequencies in the same through a feature called "Control Channel Only." It allows trunk tracking of Motorola systems without programming in each voice channel, which can save a lot of time and keypad entries. Because of the way the Motorola protocol designates voice channels, the feature only works in the 800 and 900 MHz bands. Instructions for the 250D can be found on pages 73 and 74 of the Owner's Manual.

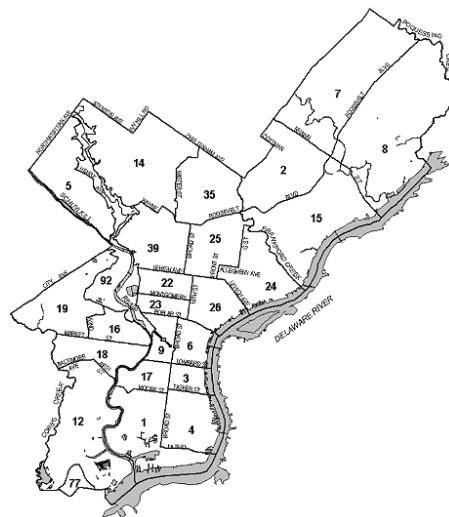
❖ Philadelphia Radio Systems

The City of Philadelphia operates what amounts to two trunked radio systems, one for law enforcement and the other for fire and other city services. There are some interconnections between the two systems that allow different departments to communicate with each other, but when programming your scanner you can load them independently.

Most law enforcement transmissions are in the clear, but you will find that Emergency Medical Services and Fireground activity are typically encrypted.

The Fire and City Services system is assigned the following frequencies: 866.2875, 866.3625, 866.8375, 867.0625, 867.0875, 867.5625, 867.5875, 867.8625, 868.0625, 868.0875, 868.2875, 868.5875, 868.7875, 868.8125 and 868.8375 MHz.

Dec	Hex	Description
3760	0EB	Medical (Central Dispatch)
3792	0ED	Fire (North Dispatch)
3824	0EF	Fire (South Dispatch)
3856	0F1	Medical (North Dispatch)
3888	0F3	Medical (South Dispatch)
3920	0F5	Fire Tactical 1 (South) [Encrypted]
3952	0F7	Fire Tactical 2 (South) [Encrypted]
3984	0F9	Fire Tactical 3 (South) [Encrypted]
4016	0FB	Fire Administration
4048	0FD	Fire Tactical 1 (North) [Encrypted]
4080	0FF	Fire Tactical 2 (North) [Encrypted]
4112	101	Fire Tactical 3 (North) [Encrypted]
4144	103	Fire (All)
4176	105	Police/Fire Interoperability 1
4208	107	Police/Fire Interoperability 2



4272	10B	Hazardous Materials (Encrypted)
4368	111	Emergency Operations Center 1
4400	113	Emergency Operations Center 2
4432	115	Emergency Operations Center 3
4464	117	Emergency Operations Center 4
4496	119	Airport Police
4528	11B	Airport Fire [Encrypted]
4560	11D	Airport Emergency 1
4688	125	Airport Operations
4944	135	Airport Emergency 2
5008	139	Water Department (Dispatch)
5136	141	City-wide (Dispatch)
5168	143	City-wide Events 1
5200	145	City-wide Events 2
5232	147	City-wide Events 3
5360	14F	Sheriff's Office (Dispatch)
7376	1CD	Sheriff's Office (Warrants)
7600	1DB	Airport Communications Center
8240	203	Health Department - Dispatch
8560	217	Sheriff Administration

The Law Enforcement system uses the following frequencies: 866.1000, 866.3375, 866.5875, 866.6875, 866.7875, 866.8000, 866.8125, 867.1000, 867.1125, 867.3500, 867.5750, 867.8125, 867.8375, 867.9375, 868.0500, 868.3125, 868.3375, 868.5375, 868.5500 and 868.5625 MHz.

Decimal	Hex	Description
16	001	Far Northeast (Districts 7 and 8)
48	003	Northeast (Districts 2 and 15)
80	005	North Central (Districts 22 and 23)
112	007	Central (Districts 6 and 9)
144	009	South (Districts 1 and 17)
176	00B	Southwest (Districts 12 and 18)
208	00D	West (Districts 16 and 19)
240	00F	North (Districts 14 and 35)
272	011	Northwest (Districts 5 and 39)
304	013	East (Districts 24 and 26)
336	015	District 25
368	017	Administration and Alerts (City-wide)
400	019	Traffic Unit
432	01B	City-wide
464	01D	South Two (Districts 3 and 4)
496	01F	Special Events 1
528	021	Special Events 2

❖ Scanning Philadelphia on the BC250D

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Channel Only (CCO) feature. Programming both systems requires entering only five frequencies in two banks and choosing the proper selections for each bank. You will need to use two of the ten available banks for Philadelphia, since the scanner is limited to a single CCO system per bank. Have a copy of the Owner's Manual handy to see exactly how to program in the frequencies and set the proper bank selections.

The Fire and Public Works system has two defined control channels, one on 868.8125 MHz and the other on 868.8375 MHz. Select a bank to use for this system and program in these two control channel frequencies. From the Menu mode, set selection 1 (Motorola 800 MHz Type 2, the display will show "TYPE2 800") and set the control plan to choice 2 ("SCAN OPTION 2:TRUNK") with the bank number as a control channel only ("CNTRL CH ONLY"). Frequency Plan 1, the default, should work just fine.



The Law Enforcement system has three control channels, two of them active and one identified as an alternate. The frequencies are 868.5375 MHz, 868.5500 MHz and 868.5625 MHz. Select a second bank to use for this system (do not try to use the same bank for both systems – the scanner will not track properly) and program in the three frequencies. Set selection 1 ("TYPE2 800") and control plan to control channel only ("CNTRL CH ONLY") as before. This system appears to require the use of Frequency Plan 2.

Once these two systems are properly programmed and you are in a good location for reception, the BC250D should be able to track and monitor conversations. Remember that some activity, especially fireground and medical transmissions, may be encrypted and therefore will not be understandable.

Try it and let us know how things work out!

❖ Milwaukee, Wisconsin

In previous columns we've covered New York's difficulties and eventual cancellation of their statewide OpenSky project, but there are other locations with similar problems. The city of Milwaukee, Wisconsin, has spent several years and millions of dollars to get a working OpenSky installation and it still isn't operational.

Milwaukee is the largest city in Wisconsin, with a population of just over 600,000 people in an area of about 100 square miles. It is located on the southwestern shore of Lake Michigan about 100 miles north of Chicago.

In October 2003 the city awarded a \$15 million contract to M/A-COM for the installation of an OpenSky system to replace the legacy analog radio equipment used by various city employees. At that time it was expected to be complete and operational in 2005.

The implementation was originally planned to occur in four phases. The first phase, which now appears to be working, was to provide a data-only connection to mobile data terminals (MDTs). The second phase was for law enforcement departments to transition to OpenSky, to

be followed by Fire and Emergency Medical Services. The final phase was to bring all the other departments, such as Public Works, on to the system.

Tests last November revealed a number of "dead zones" where radios could not get sufficient coverage to reliably access the network. In addition, dispatchers were having enough difficulty with the new system that police officers on the street were feeling unsafe. M/A-COM has not commented on these recent difficulties in Milwaukee and the city is still officially supporting correction of the problems and eventual transition to the new system, but with each missed deadline the authorities sound less and less sure about the outcome. New York's decision to cancel their contract has not gone unnoticed in Milwaukee, but it is not clear what the final straw might be for the city to formally give up on OpenSky.

In the meantime, Milwaukee is continuing to use the old system as they work with M/A-COM to address the OpenSky problems. Other city departments, including the Fire Department, Health Department and the Department of Public Works are all slated to join the new system if and when it becomes operational. Until then, the old conventional equipment remains in operation on the following VHF and UHF frequencies.

Frequency	Description
151.265	Forestry Division
151.280	Fire Mutual Aid Radio Channel (MARC) 2
153.590	Water Department
153.830	Fireground
153.845	Fire Mutual Aid Radio Channel (MARC) 1
153.890	Fireground and Hazardous Materials
154.070	Fireground
154.220	Fire Dispatch
154.265	Inter-Agency Fire Emergency Radio Network (IFERN)
154.295	Fireground "Blue" and Mutual Aid
154.340	Fire Dispatch (North Shore)
154.355	Fire Training
154.385	Fire (Dispatch for 1 or 2 units)
154.400	Fire Tactical 1 and Mutual Aid
154.415	Fireground
154.445	Fireground (North Shore)
155.340	Emergency Medical Services (EMS B)
155.400	Emergency Medical Services (EMS A)
155.715	Bureau of Municipal Equipment
156.225	Sanitation and Snow Plows (North)
156.800	Marine Channel 16
157.075	Marine Channel 81
158.820	Streets Department
159.120	Fire (Truck to Truck)
159.150	Fire (Dispatch for 3 or more units)
159.195	Sanitation and Snow Plows (South)

Frequency	Description
453.4000	Paging (Voice and Data)
453.5250	Public Library
453.5250	Public Museum
453.5750	Housing Authority
453.7000	Public Schools
453.9750	Facilities Management
458.0375	Port of Milwaukee
458.1375	Port of Milwaukee
460.0750	Police District 3 and 5 Dispatch
460.2250	Police District 4 and 7 Dispatch
460.3500	Police District 1, 2 and 6 Dispatch
460.4500	Police District 4 and 6 Records & Station
460.1500	Police Incident Command
460.0250	Police Tow Desk and Parking Enforcement



460.3750	Police City Dispatch
460.4750	Police District 2 Records
460.1750	Police District 3 Records
460.3000	Police District 7 Records
460.4250	Police District 1 and 5 Records
460.2000	Police Car-to-Car
460.5000	Police Vice Squad
460.2750	Police Intelligence Division
460.6000	Police Street Crimes and Tactical Squads
460.1250	Police City Hall
464.4250	Public Schools
464.6750	Public Schools

❖ Dayton Hamvention

If it's May it must be time for the Dayton Hamvention, an annual gathering of amateur radio enthusiasts in Dayton, Ohio. This year the festivities begin on Friday, May 15th, and run through Sunday the 17th. A full schedule of technical forums runs concurrently with 500 indoor exhibit spaces, where vendors market their latest products and services. Meanwhile, outside there are 2,500 outdoor flea market spots with everything from radios and computers to parts and supplies. The variety of items sold over the years led to the slogan, "If you can't find it at Dayton, you can't find it."

For many attendees the Hamvention is an opportunity to catch up with friends and spend an enjoyable weekend pursuing their particular interests. I would encourage everyone who is able to take a long weekend and experience the world's largest amateur radio convention and exposition. As in previous years, I plan to meet up with friends and scout the flea market looking for old ("vintage") computers and calculators while taking some time to chat with radio and scanner manufacturers inside Hara Arena.

If the Hamvention itself isn't enough of an excuse to travel to southwest Ohio, the Dayton area also offers the Aviation Trail, a set of 47 sites that highlight the development of flight. Nearby is the National Museum of the U.S. Air Force, a 17-acre indoor facility with displays of more than 400 air and space vehicles. Numerous other attractions and points of interest can make the trip enjoyable for almost anyone. Check the official web site at www.hamvention.org.

That's all for this month. More scanner information is available on my web site at www.signalharbor.com. If I don't see you at the Dayton Hamvention you can always send me electronic mail at dan.veeneman@monitoring-times.com. Until next month, happy scanning!

Look Familiar?

A number of our sharp-eyed readers noticed that the text of the April Ask Bob column was nearly identical to the March issue. We apologize for the oversight in layout, and we have posted the correct April column to our website at www.monitoringtimes.com/html/mtaskbob0409.pdf. The correction will also be made to the column in the end-of-year anthology for posterity!

However, heading that column was the following caveat regarding working on vintage radios which is worth repeating here:

Hazards of the All American Five

In our February column, Dan Marshall addressed the issue of attaching an antenna to the vintage Hallicrafters S38E. Walter Shepherd, K2ZPA, wrote with a reminder of the danger built into the old "All American Five" radios. These were receivers that simply connected all five tube filaments in series across the power line and one side was connected to the chassis ground.

In these old radios before the days of polarized plugs (one blade wider than the other), it was easy to insert the plug in the wall socket so that metal parts on the chassis were "hot," posing a dangerous shock hazard for the unsuspecting user standing on a wet floor or near other earth-grounded objects.

When working with old AC-powered radios that don't have power transformers, it's a good idea to have a voltmeter handy to measure any AC presence between the exposed metal parts of the radio and the AC neutral or ground wire. If there is, reverse the plug in the wall and check again.

If a dangerous AC level is still present, you might need to acquire an isolation transformer (120VAC input: 120VAC output) to reduce the shock hazard.

Q. The transmit frequency range of my ham radio handy-talkie is capable of being expanded to include other services like MURS, FRS, MARS, public safety and business. If I have licenses and authorization for several services, can I use just one radio that meets all the separate electrical requirements?

A. No. FCC Rules and Regulations specifically state that a radio may be used only on the frequencies authorized for the service for which it was designed, and that radio must be FCC certified for that one service. It isn't an issue

of electrical specifications; it's to prevent radio users from unlawfully transmitting and causing interference on frequencies for which they do not hold a license or authorization.

So what prohibits an individual from purchasing and unlawfully using any kind of radio? Nothing. Hopefully, the Commission will eventually capitulate on this folly and allow frequency-agile radios to be programmed for use legally by individuals with multiple authorizations and licenses, thereby saving legitimate radio users considerable unnecessary expense.

Q. I'd like to use the Grove Scanner Beam for transmitting on the VHF/UHF ham bands. What are the power and frequency limitations? (Rob Smith, VE7RSV)

A. The Scanner Beam follows the same design parameters as conventional log-periodic dipole array (LPDA) rooftop TV antennas, but its elements are cut and spaced for the VHF/UHF communications bands up to 1300 MHz. It comes with a standard TV-style VHF/UHF outdoor balun transformer with a 4:1 impedance ratio for coaxial cable.

The fine wire in the balun transformer will endure perhaps 25 watts, certainly 5-10 watts, for transmitting. If you can find a replacement, transmitting-style, 4:1 balun for the VHF/UHF range, then there is no reason the antenna itself can't take at least 100 watts of RF power.

So far as the amateur radio frequency ranges, here's what the lab measurements show:

50 MHz, 1.9:1
144 MHz, 3.3:1
220 MHz, 3.3:1
420 MHz, 2.5:1
915 MHz, 3:1
1296 MHz, 2.1:1

Q. Do receivers with USB/LSB reception have significant advantages over receivers with only SSB reception? (Mike Bryson, Yukon, OK)

A. A conventional amplitude modulation (AM) signal has three parts: a center carrier (the unmodulated signal), and an upper and lower sideband which are identical in content (modulation). One sideband and the carrier are unnecessary for detection and demodulation by the receiver and can be deleted.

Single sideband (SSB) is a transmission consisting only of one sideband, a choice of either the upper or the lower. By eliminating the carrier and one sideband, the signal takes up much less spectrum space, and reception is

improved because the receiver can use narrower filters to extract the signal, thus avoiding the noise and interference experienced with a wider signal.

In the early days of SSB communications, detection was done with the CW (Morse code) beat frequency oscillator (BFO) control, which injected the missing center carrier so that the modulation could be detected. The operator would tune his receiver slightly higher or slightly lower than that frequency to either the upper or lower sideband (USB, LSB) that was present. As technology progressed, the BFO was replaced by a product detector which worked much better by allowing switch selection of either USB or LSB.

All modern communications receivers use product detectors. When you encounter an SSB signal, you simply select either USB or LSB, whichever is appropriate to detect the single sideband being used in transmission. Some simple multiband portable radios still use the less expensive BFO and advertise "SSB," but they still receive USB or LSB with careful tuning.

Q. How can I protect my multiband portable radio from damage caused by a severe electromagnetic pulse? (Roger Henderson, Memphis, TN)

A. Because of widespread concerns about EMP several years ago, a number of extensive tests were performed by a government-approved laboratory to see just what those vulnerabilities were.

They built a massive electrical-discharge machine and put a variety of electronic products nearby, some with shielding, some with external wires, some just bare. The results showed that concern for damage from EMP had been greatly exaggerated.

The most vulnerable – and that wasn't many of them – would be electronic devices with long leads on them that would behave like electrical-discharge pickup antennas. Most devices without the long wires were pretty safe, especially if they had metal cabinets. And all devices were completely safe if enclosed in a simple metal shield.

In other words, if you have a metal box to put the radio in, or even wrap it in aluminum foil, it would be completely protected.

Questions or tips sent to Ask Bob, c/o MT are printed in this column as space permits. Mail your questions along with a self-addressed stamped envelope in care of MT, or e-mail to bobgrove@monitoringtimes.com. (Please include your name and address.)

Ham QRP: Short Wave's Hidden Underground

It's springtime and ham radio is busting out all over. It's going off in several interesting technical directions all at once. The most interesting one for us is the use of extremely weak signals on noisy channels.

On HF (3-30 megahertz, "short wave"), just about everyone is complaining about lower solar activity and higher noise. Out on the cutting edge, though, people are quietly doing something about it. Often, they're doing it very quietly, since part of the idea is to extract usable information from signals buried so deeply in the noise that human ears (and speaker diaphragms) are barely budged by them.

Some of those odd little sounds on HF, that you thought were just noise from your computer or normal background grunge, are neither. They're people communicating world-wide on bands that otherwise sound dead, usually with tiny homebrew transmitters that fit in your hand instead of in a large building. It's about as far as you can get from the ultra-expensive superstations that dominate in every ham radio contest, but it's still in the amateur radio hobby. It's radio for the hard core.

❖ Turning Down the Power

"QRP" is an international signal meaning "reduce power." In ham radio, though, "QRP" is the jargon for extremely reduced transmitter power output. It's normal to think in milliwatts. Five watts is considered excessive, and even two watts put you in the flame-thrower class.

Using a little ingenuity, QRP signals can be received clear around the world. Often, computer programs are used to find and extract faint traces of information on barely functioning channels.

You might have heard of *SETI@Home*, where bands of radio noise are searched for any trace of nonrandom content that may be a signal. The concept is similar here, except that transmissions are scheduled and have known characteristics. Compared to finding life in the universe, this is easy. We know there's intelligent life on Earth, even though we don't always act that way.

What we're also learning is something the old-time DX (distant transmitter) chasers always knew: A dead band is usually anything but. It's only dead to the strongest signals. Who knows what lurks down in the noise? That little intermittent beep could be another station waiting to get into your log.

❖ K1JT Modes

Lately, I've been experimenting with a propagation spotting mode called WSPR. This stands for Weak-Signal Propagation Reporter. It's usually called "whisper." The name is appropriate, since the mode not only handles very weak signals, but actually requires them.

WSPR is implemented by a rather slick little Windows program written by Joe Taylor, K1JT. It's available for free at his site, physics.princeton.edu/pulsar/K1JT/. A very basic quick-start guide is at physics.princeton.edu/pulsar/K1JT/WSPR_Quick_Start.TXT. Somewhat more comprehensive instructions are at www.frenning.dk/OZ1PIF_HOMEPAGE/Whisper_Guide.html.



This mode's very low information rate (around one baud) and very narrow bandwidth (around 6 hertz) tend to make it sound like just another grungy carrier. That's provided you hear it at all. Things have a way of just popping up. While I was writing this, KL7OA in Anchorage, Alaska, appeared on a very quiet 14097.19 kilohertz (kHz), where I only heard computer whine. This is fun stuff!

Like most of these modes, WSPR is implemented in a small freeware application for Windows and Linux, with a Mac version apparently in the works. The user interface is pretty minimal, but once it's given a few simple settings, you just set up on a frequency and wait. The waiting is handled by the computer, which goes in and out of receive on a relentless, two-minute schedule. You do other things on your computer, and the log either fills

up or it doesn't.

Another weak-signal is called WSJT (Weak Signal - Joe Taylor). K1JT did write the original program, but now it is open-source. WSJT contains several modes, which were originally designed for meteor scatter and "moon bounce" communication on frequencies much higher than ours, using transmitter power that can approach that fabled "amateur legal limit." However, its JT65 mode has caught on for weak-signal HF. There's a good help file at www.pe2pe.eu/images/WSJT%20on%20HF.htm.

Again, we're looking at a single-tone mode. For technical reasons relating to the design of ham radio transmitters, these use power efficiently. WSPR, however, uses a steady pilot/sync tone that is then frequency-shifted at a very low rate. There are three sub-modes with increasing shifts.

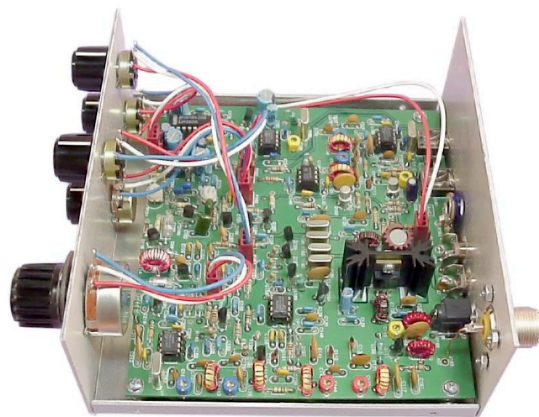
People who've been at the utility DX hobby for any length of time might be surprised by how much this mode sounds like the old Russian "Polytone," a famous station that encodes suspected spy "numbers" into distinct audio frequencies. Before the Polytone shifts into a much faster mode, its startup preamble can sound a lot like WSJT.

The greater frequency shift makes JT65 easier to hear on a speaker than WSPR. It also really stands out on the typical spectrum display of ARGO or similar software. In fact, while I was sitting here writing this, a JT65 signal just faded in and out on 30 meters. Even with this greater audibility, however, loggings have a way of popping out of the noise on seemingly dead bands. Like I said, this is fun stuff!

❖ Morse Telegraphy Modes

Morse telegraphy, using a transmitter and a switch, is not dead. It's no longer required for the ham radio license, but there are still plenty of people hip to the code lifestyle. For me, it always feels like music, and I like music.

Your radio probably has a "CW" mode, with a narrow filter and a smaller carrier offset. This stands for Continuous Wave. It refers



A small single-band transceiver kit from Oak Hills Research costing around \$150 US.



to the fact that when the switch is closed, a continuous signal is produced. If you want to go back far enough, it also distinguishes the mode from the damped oscillation of the spark transmitters that were replaced by alternators and then vacuum tubes. Yes, it's an *old* mode.

The best communications system developed, anywhere, ever, was the maritime Safety Of Life At Sea (SOLAS) network on the medium wave band around 500 kilohertz (kHz). After the sinking of the *Titanic*, a lot of international rule making went into ensuring that ships in distress on the high seas would be heard and aided in a timely manner.

This was straight CW Morse telegraphy, with hundreds of highly trained operators standing watch at radios worldwide. That band's peculiar propagation, and the huge antennas used by shore stations, could reliably link up most of this planet's surface at any one time. Like the K1JT modes, precise net timing was helpful. Old clocks were marked with the two "silent periods" in each hour, when everyone shut up and listened for distress calls.

Ultimately, the system was doomed by less labor-intensive computer-based modes. In its day, however, it sure worked well. You can hear how things used to work in the weekly transmissions of the Maritime Radio Historical Society from Point Reyes, California. You can also, of course, learn Morse yourself, as antiquated as that sounds. People still copy code way better than any software available.

Some of the weak-signal CW of interest to us today actually isn't ham radio, though some of the people doing it are licensed hams. It's done by several "underground" beacon groups, which we've mentioned in this column before. These are true beacons, serving to indicate band propagation by simply identifying themselves forever at a very low signal level.

A few of these are operating as "hifers," with small antennas that comply with rules authorizing their use. The rest, though, are using larger wire antennas, sophisticated solar power supplies, interesting circuits, and in fact, everything but licenses. Their milliwatt signals have been logged worldwide.

While these are completely illegal, they're too small to attract the wrong kind of attention. They tend to be hand built by radio craft-people living in the great outdoors. Often, they're hidden under rocks or bushes deep in the wilderness, far from roads or people in general. Some have names, such as Blinky, the Inyo Whooper (a local bird species), or the Night Hawk (a night-only beacon that appears to have been recently retired).

All of these use standard on-off keying. Some are in Morse code, while others are "dashers," switching on and off at varying rates. A few transmit measurements of temperature or wind speed.

These tend to fade in and out. The peaks can be picked out easily by ear, but it's extremely helpful to use a computer spectrum display optimized

for buried CW signals.

We've mentioned the popular ARGO program. Here, I have a very large computer monitor (used for photo editing), and I prefer Spectrum Lab. It's a complex ham program with a steep learning curve. It assumes you either took engineering in school or know people who did. However, once it's configured right, the display is truly awesome.

By the way, ARGO was originally written to find and decode extremely weak, extremely slow, Morse code signals – a fertile area of experimentation called QRSS. Like QRP, "QRS" is an international signal. It means "reduce speed (of sending)."

QRSS, then, means to REALLY reduce speed. We are no longer talking in words per minute, but more like minutes per word. At these speeds, the keying is done by machine. Although it's straight Morse, other emissions besides plain CW can be used.

Again, power outputs are typically in milliwatts. Even so, QRSS signals have been heard worldwide on several bands.

❖ Frequencies

The primary WSPR net frequency is 10138.7 kHz, upper sideband (USB). This is a "dial/window" frequency, meaning it's the one you actually see. Stations, which can include K1JT himself, alternate long transmissions. Accurate time sync is essential. I've only heard one-way transmissions, but some hams have made contacts.

Other WSPR "dial" frequencies are 1836.6, 3592.6, 5287.2, 7038.6, 14095.6, 18104.6, 21094.6, 24924.6, and 28124.6 kHz USB. Transmit frequencies are higher, but the software worries about that, so you don't have to.

WSJT on HF is relatively new (2006-7). It still gets jammed occasionally by hams who just don't understand the situation. Dial frequencies are 1805, 1838, 3576 (very popular in Eastern Europe), 7039 (Europe), 7076 (USA), 10139, 14076.0, 18102, 21076, 24920, and 28076 kHz USB.

The majority of QRSS activity takes place between 10140 and 10140.1 kHz. Extreme frequency stability and accurate receiver calibration are helpful. Transmitters and even receivers are often homebrew and crystal controlled. Similar activity has been reported around 3580 kHz on 80 meters and just above 7000 kHz on 40. Messages are in Morse, though various modulations are used.

Finally, here's my own list of underground hobby beacon frequencies. Keep in mind that any such listing is a momentary snapshot of a highly unstructured activity, where frequencies drift and transmitters change every few weeks.

Frequency	ID	Description
3449.7	OK	Oklahoma, 300 mW
4001.3	PA	?
4011.8	Dasher	Florida
4024.2	JA	?
4076.8	Unid	Steady, drifting carrier
4077.3	MO	Oklahoma, 200mW
4078.0	WT	Colorado, 300 mW, night
4078.2	W	Heard in California
4079.0	TMPnnn	CA desert, 1 watt, sends temperature degrees F
4089.2	Dasher	Death Valley National Park
4094.2	PA	Arkansas
4094.8	?	"Sputnik," WV, 70 mW, night
4095.8	Dasher	"Coxie," CA desert, chirps
4096.1	Dasher	Joshua Tree Natl. Monument, 400 mW
4096.3	Dasher	"Hexie," Joshua Tree NM, 400 mW
4096.6	Dasher	"Kelsie," Mojave Desert, 400 mW
4097.2	Dasher	"Inyo Whooper," CA, above Death Valley
4097.4	KX + temp	OK, sends inside and outside temp 3 times
4102.3	W	Wind Beacon, CA desert, beeps are wind speed
4192.7	?	New, Arizona?
4193.6	VA	Not much known
5157.7	Dasher	"Blinky," Florida
5484.0	SD	San Diego, CA
5499.1	Dasher	WA
6549.3	FL	Florida, 300 mW
6626.7	Dits	Mojave Desert, day only
6700.4	Dasher	Joshua Tree NM
7382.5	K	?
7997.7	Dasher	"Pike Jr.," Pikes Peak, CO
7997.9	S	Desert, maybe AZ
8067.0	Dasher	?
8188.7	W	Colorado, day only
8211.9	OR	Oregon, 200 mW
10236.5	ECHO	Florida, 400 mW
10243.8	Dasher	Florida
10245.2	Dasher	Pike's Peak, CO
11002.7	LC	Lost Creek, CO
11002.7	CO	Colorado, 300 mW
13554.5	AZ	Arizona
13555.3	GA	Quebec
13555.7	WV	West Virginia
13557.0	EH	CT
13558.0	HI	CT
13559.0	NHVT	New Hampshire
14400.0	JA	Day only

ABBREVIATIONS USED IN THIS COLUMN

AFB.....	Air Force Base
ALE.....	Automatic Link Establishment
CAMSLANT	Communications Area Master Station, Atlantic
COTHEM.....	Customs Over-The-Horizon Enforcement Network
CW.....	On-off keyed "Continuous Wave" Morse telegraphy
DSC.....	Digital Selective Calling
E10.....	Israeli female phonetic letter voice callup/message
EAM.....	Emergency Action Message
FAX.....	Radiofacsimile
HFDL.....	High-Frequency Data Link
HF-GCS.....	High-Frequency Global Communication System
LSB.....	Lower Sideband
MARS.....	Military Affiliate Radio System
Meteo.....	Meteorological (weather office)
Navtex.....	Navigational Telex, in SITOR-B
NDB.....	Non-Directional Beacon
PR.....	Puerto Rico
RTTY.....	Radio Teletype
Selcal.....	Selective Calling
SITOR-A.....	Simplex Telex Over Radio, mode A
SITOR-B.....	Simplex Telex Over Radio, mode B
UK.....	United Kingdom
Unid.....	Unidentified
US.....	United States
USAF.....	US Air Force
USCG.....	US Coast Guard
VOLMET.....	Formatted aviation weather broadcasts

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations have their ENIGMA (European Numbers Information Gathering and Monitoring Association) designators in ().

319.0	VAR-NDB, Stavanger, Norway, CW at 2206. (Ary Boender-Netherlands)
359.0	LOR-NDB, Lorient, France, CW at 0452. (Boender-Netherlands)
408.0	BRK-NDB, Wien/Bruck, Austria, CW at 2233. (Boender-Netherlands)
490.0	B-Istanbul, Turkey, Navtex in Turkish at 0017. D-Riviere-du-Renard, Canada, Navtex in French at 0439. W-Coruna, Spain, Navtex in Spanish at 2340. (Boender-Netherlands)
518.0	R-Monsanto Radio (CTV251), Portugal, Navtex at 2250, then stepped on by regular Navtex schedule of "S" (DDH51, Pinneberg, Germany), at 2300. (MPJ-UK)
3413.0	Shannon VOLMET-Shannon Aeradio, Ireland, European aviation weather at 0335. (Ken Maltz-NY)
3810.0	HD210A-Ecuador Navy standard time station, Guayaquil, pips and Spanish announcements, at 0700. (PPA-Netherlands)
4079.0	RMP-Russian Navy, Kaliningrad, CW weather forecast for group callsign REO, at 1701. (MPJ-UK)
4372.0	"I-4-P"-US Navy, calling Giant Killer (US Navy, VA), at 2334. (Mark Cleary-SC)
4736.0	Papa Foxtrot-US Navy Link-11 coordination with Delta, Echo, and India, at 1221. (Cleary-SC)
5129.0	T223-US Army or National Guard, ALE and voice with R24175, at 2142. (Jack Metcalfe-KY)
5135.0	SEMOHQ-NY State Emergency Management headquarters, Albany, ALE at 0714. (PPA-Netherlands)
5237.5	DKB-US Army Special Ops, working CLS, ALE at 2155. (Metcalfe-KY)
5320.0	Sector New Orleans-USCG, working Cutter <i>Marlin</i> (WPB 87304), at 2342. (Cleary-SC)
5658.0	Bangladesh 023-Bangladesh Biman Airlines DC-10, registration S2-ACR, working Mumbai at 2045. (Patrice Privat-France)
5714.0	FUI-French Navy flight following, Corse, coordinating RTTY on 5716 with "X-5-T," at 2038. (ALF-Germany)
5717.0	DHO32 Junior Operator-German Air Force, working DHM91, Air Transport Command, at 1134. (ALF-Germany)
5732.0	ABQSEC-COTHEM Remote transmitter, Albuquerque, NM, ALE sounding at 0030. (ALF-Germany)
5733.5	Unid-Probable Russian Air Defense, CW tracking data in a longer format than usual, at 2326. (ALF-Germany)
5750.0	Aris-Greek Coast Guard, Pireus, net in Greek with many vessels using 3-letter calls, at 1710. (ALF-Germany)
6215.0	CAMSLANT-USCG, VA, radio check with Lantarea Command Center, at 1549. (Cleary-SC)
6340.5	NMF-USCG, Boston, MA, FAX weather chart at 2047. (MPJ-UK)
6577.0	Coast Guard Rescue 2001-USCG HC-130J, position for New York

at 1226. (Cleary-SC)	
6586.0	New York-North Atlantic air route control, selcal EQ-AL to Delta 121, a Boeing 767 registration N179DN, at 0617. (Allan Stern-FL)
6650.0	PALO5-Unlicensed "Echo Charlie" band, France, LSB digital file transfers, waterfall graphics, and voice orderwire type chatter with YVES61, at 1340. (ALF-Germany)
6760.0	FPI-French Navy flight following, St. Assisi, working "H-0-T," pilot with British accent, at 1110. (ALF-Germany)
6761.0	Ethyl 54-USAF tanker, refueling coordination with transport Reach 3600, at 0012. (Cleary-SC)
6765.1	HSW-Bangkok Meteo, musical chimes and English voice synthesized weather, at 1847. (PPA-Netherlands)
6825.0	FAV22-French military Morse code practice, CW markers at 1232. (MPJ-UK)
6840.0	EZI-Israeli phonetic alphabet station (E10), identifier and message at 2101. (Mike-West Sussex, UK)
6857.5	Zero-UK Army Royal Signals net control, working C10 and C20, at 1138. (ALF-Germany)
6963.0	7P41-Venezuelan Navy, calling T8R1 in LSB ALE, at 0800. (MDMonitor-MD)
7642.0	Lightning Main-Possible US Marine Corps, LSB and USB with Weapons, at 1630. (Metcalfe-KY)
7903.5	CL1-US Federal Bureau of Investigation, Cleveland, OH, calling OM2 (FBI, Omaha, NE), ALE at 1000. (MDMonitor-MD)
7932.0	KNNP491WV-American Red Cross, WV, ALE sounding, also on 7480 and 7935, at 1446. (Metcalfe-KY)
8047.0	T040NN-Tennessee Army National Guard at state Emergency Operations Center, calling HQ703N (National Readiness Center, VA), at 2021. (MDMonitor-MD)
8050.0	DKB-US Army, GA, working helicopter 825768, ALE at 1406. (MDMonitor-MD)
8156.0	Coral Harbour Base-Royal Bahamas Defence Force, calling C6WC, at 1458. (Cleary-SC)
8337.6	Shark 05-Probable USCG, weather and ops report with Shark 47, at 2352. (Cleary-SC)
8395.0	UAWH-Russian Vessel <i>Kapitan Boubnov</i> , SITOR-A auto telex with Murmansk Radio (shore on 8435.0), at 1515. (MPJ-UK)
8414.5	005741040-Hai Phong Radio, Viet Nam, answering DSC call from 563172000, Singapore registry tanker <i>Orchid</i> (S6DK), went to voice on 8294, at 1626. (PPA-Netherlands)
8912.0	Omaha 46CS-US Customs P-3, message relay with Hammer (COTHEM West Node, March Air Reserve Base, CA), at 2313. (Cleary-SC)
8983.0	CAMSLANT Chesapeake-USCG, VA, setting radio guard with Coast Guard 2001, a C-130J, at 2340. (Stern-FL)
8992.0	LL 82-US Navy P-3C, working Andrews HF-GCS, at 2025. (Cleary-SC)
9007.0	Canforce 85-Canadian Forces, ops-normal for Trenton Military, at 1320. (Cleary-SC)
9025.0	NW1-US military Nightwatch 1, a National Airborne Operations Center E-4B, working ADW (Andrews AFB, MD), ALE at 0030. (MDMonitor-MD) JNR-Salinas, PR, calling HAW, Ascension Island, ALE at 1928. PLA-Lajes, Azores. calling HAW, ALE at 1933. ICZ-Sigonella, Italy, sounding at 1936. 160025-USAF C-5, sounding at 2005. (Maltz-NY)
9106.0	359WPLY-AT&T, Pearl City, HI, ALE with 791WNIY, Southwestern Bell, TX, at 1540. (Metcalfe-KY)
10201.0	RCV-Russian Navy Black Sea Fleet, Sevastopol, CW traffic for RIP90 and RBE86, at 0959. (PPA-Netherlands)
10493.0	WGY901-US Federal Emergency Management Agency Region 1, MA, working an unheard station at 2103. (Cleary-SC)
10538.6	Swordfish 13-USCG HU-25 Falcon Jet, ops-normal for Sector Key West, at 2135. (Cleary-SC)
11175.0	Andrews-USAF HF-GCS, MD, EAM for Root Ball (likely Nightwatch player), at 2124. (MDMonitor-MD)
11226.0	210192-USAF C-17A, calling AED (Elmendorf AFB, AK), ALE at 2259. (Cleary-SC)
11232.0	Trenton Military-Canadian Forces, selcalling Canforce 2689 in the Caribbean, sent aircraft to 9007 kHz, at 1648. (Stern-FL)
11330.0	New York, selcal PS-AR and position from Delta 499, a Boeing 737 registration N3765, at 1604. (Stern-FL)
12577.0	ZCSP3-Cayman registry tanker <i>Stolt Confidence</i> , DSC safety test with Madrid, at 1116. (MPJ-UK)
13200.0	Bat 42-USAF EC-130H, patch via Offutt HF-GCS to Bat Ops at 1941. (Cleary-SC)
13927.0	AFA4DD-USAF Mars, TX, patching Excite 01, aircraft near Honduras, to Homestead Air Reserve Base, FL, at 1730. (Stern-FL)
17967.0	9V-SKE-Singapore Airlines flight 318, an A380, HFDL position for Al-Muharraq at 1210. (PPA-Netherlands)

May Mixed Bag

This month we look at progress in identifying activity associated with the oil and gas platforms of the Mexican State Petroleum organization PEMEX, examine an uncommon US Air Force modem and a report on a Colombian Military Network.

❖ PEMEX Voice Activity

We've featured the ALE activity from the Mexican oil platforms in the Gulf of Campeche in the May and June 2008 and February 2009 editions of this column. Since that time, there have been no reports of any activity other than regular ALE soundings by the stations involved.

I happened to be checking some PEMEX frequencies recently, when I heard a 100bd FSK selective calling (selcal) nearby their 8291 kHz channel, followed by a couple of guys chatting in Spanish. Listening closely, both mentioned the Rebombero platform and ordering supplies, including groceries.

Monitoring the channel over a few days revealed the selcal as standard 100bd/170Hz GMDSS or DSC (Digital Selective Calling). This is the same system used on a number of protected channels for marine distress signaling. Here you can see the exchange that opens up the link between the two stations as displayed by the Hoka Code300-32 software:

```
FORMAT SPECIFIER: SELCALL individual
CALLED PARTY ADDRESS: 123456789
CATEGORY: ROUTINE
SELF IDENTIFICATION: 345070048 Mexico
TELECOMMAND: J3E telephone
RECEIVE FREQUENCY INFORMATION: 8294.2
kHz
TRANSMIT FREQUENCY INFORMATION:
8294.2 kHz
```

```
FORMAT SPECIFIER: SELCALL individual
CALLED PARTY ADDRESS: 345070048 Mexico
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SELF IDENTIFICATION: 123456789 Mexico
TELECOMMAND: J3E telephone
RECEIVE FREQUENCY INFORMATION: 8294.2
kHz
TRANSMIT FREQUENCY INFORMATION:
8294.2 kHz
```

The GMDSS is sent +1700Hz above the voice frequency, i.e. on 8295.9 kHz (center of data). Other stations called by "123456789" include 345070017, 0018, and 0019. The best guess is that 123456789 could be the HQ at Ciudad del Carmen and the 34507 series calls are the various platforms and floating "hotels" that house the workers. GMDSS/DSC is a mode supported by most decoder packages

including those on Windows and Mac operating systems. I'd be interested to hear from other listeners of this network.

❖ US Air Force Rockwell TE204 Modem

There used to be a time when these modems were ten-a-penny and could be heard active on many frequencies at any time of day and night. However, just like the replacement of the once frequently heard Rockwell SELSCAN ALE with MIL-188-141A ALE, with the emergence of the MIL-188-110A and other high speed modems, the TE204 aka AN/USC-11 has seen its day. Then imagine my surprise in hearing one of these old friends the other day.

The fun started with a very strong signal from an OM using callsign "BASEBALL" on 11220 kHz USB. He was shortly answered by a YL operator from Lajes AFB in the Azores. In the ensuing chatter that concentrated on various radio and modem settings, it was clear that something interesting was going on. About 10 minutes later, on came the TE204 modem. It's a very distinctive sound for a very interesting modem and quite unmistakable when you hear it. You can hear a sample at Leif Dehio's excellent Digital Signals Sites (see Resources).

Below is a picture of the modem's four tone spectrum.

You can see from the various cursors on the Hoka Code300-32's display that the center of the signal sits at +1595Hz from the carrier frequency with 4 tones, spaced at 440Hz at +935, +1375, +1815 and +2255Hz respectively.

The TE204 actually operates as two pairs of regular two-tone FSK. Each bit is sent twice with a delay of 6.67milliseconds using two mark frequencies (935 and 1815Hz) and two space frequencies (1375 and 2255Hz). This provides two kinds of robustness against errors caused by the effects of noise or propagation though the ionosphere: one by spreading the same bit in time, and the other by spreading it in frequency. The on air speed is 150bd but the effective data rate is 75bd.

❖ Colombian Clover-2000 Network

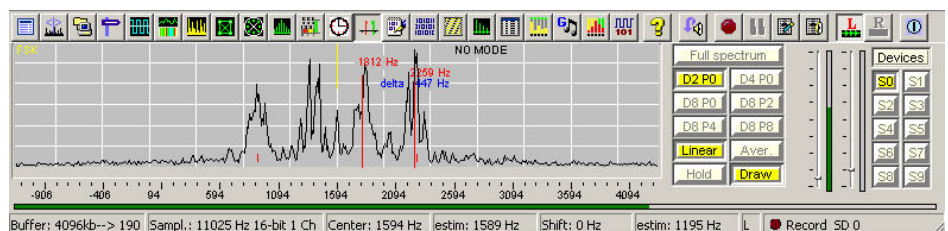
For a number of months I'd been following a number of channels of Clover-2000 activity. These guys pop up sporadically on voice in between long overs of modem traffic, make a few checks and then back to the modem. Most of the time they use either 5493 or 5709 kHz and regularly switch between USB and LSB between overs of the modem. Like the TE-204, the Clover-2000 modem, developed by US DSP maker HAL Communications, also has a very distinctive sound with its complex 8 tone modulation scheme, making it easy to recognize on the air.

During a few days of vacation I was able to put in some more concentrated listening and make a few recordings. Like many of the Spanish-speaking nets, the operators of this network have an interesting dialect that is hard to understand and I'd reached the limits of my ability to decipher what was going on. With help from a number of native Spanish speakers on the UXDF list, I was able to get confirmation of a Colombian military net and the use of African countries for station names — something that had really outfoxed me while listening. The operators called each other Libya, Nigeria (pronounced "Niheeria") and other names.

There is also a frequent burst of MIL-188-141A ALE from a single station "MALAGA" on 5493USB, too. I'm still not sure whether or not this is related to the Clover-2000 activity and it doesn't seem to trigger either modem or voice activity. MALAGA has been used in the past by the Colombian Navy, for their base at Bahia Malaga on the Pacific coast. If you get a chance, take a listen to this interesting net.

RESOURCES

TE204 Audio Clip:
www.signals.taunus.de/WAV/TE-204.WAV
Clover 2000 Clip:
www.signals.taunus.de/WAV/CLOVER-2000.HTML



PROGRAMMING SPOTLIGHT

WHAT'S ON WHEN AND WHERE?

Fred Waterer

fredwaterer@monitoringtimes.com
www.doghousecharlie.com/radio

Scandinavian Smorgasbord

Canada and the United States are nations of immigrants. A sizable number of North Americans (myself included) can trace some or all of their roots to the nations of Scandinavia, which are Denmark, Norway, Sweden and Finland. In addition, Iceland and Greenland can be included, although they are some distance from Europe. This month, we shine the *Programming Spotlight* on the broadcasters of Scandinavia.

In my lifetime, all nations in this region were on shortwave. However, one by one they have abandoned the world bands, until only Radio Sweden remains. Having said that, one can hear all of these nations using our more modern technology, from satellite to the internet. In addition, each nation has an amazing variety to their broadcasting output. Even if you don't speak the language, there is much to be heard and enjoyed!

Let's leave Canada and start our journey eastward toward Greenland.

❖ Greenland

According to the CIA *Factbook*, Danish colonization began in the 18th century. In 1953, Greenland was made an integral part of Denmark. It joined the European Community (now the EU) with Denmark in 1973, but withdrew in 1985 over a dispute centered on stringent fishing quotas. Greenland was granted self-government in 1979 by the Danish parliament. Greenland voted in favor of increased self-rule in November 2008, although Denmark continues to exercise control of Greenland's foreign affairs in consultation with Greenland's Home Rule Government. www.cia.gov/library/publications/the-world-factbook/geos/gl.html

Kalaallit Nunaata Radio (Greenland Broadcasting Company) is an independent public body administered by the Greenlandic Government. KNR broadcasts both radio and television programs every day, which can be received throughout Greenland. Its range of programs include social affairs, youth programs, cultural material, entertainment, music and news, both domestic and from all over the world.

KNR's news departments in Nuuk (the capital), North Greenland, South Greenland, and Copenhagen deliver news to the whole of Greenland in both Greenlandic and Danish. Domestic production in both the cultural and youth departments of Radio and TV mainly produce material in Greenlandic. www.knr.gl/?id=13

KNR broadcasts on 3815 kHz (USB) have been heard recently by a number of DX-

ers, judging by comments in recent editions of *DX Listening Digest* www.worldofradio.com, generally between 21 and 22 UTC (Should be an hour earlier in our summer). In *DXLD* 9-015, Canadian DXer Sylvain Naud reported hearing 720 kHz from Greenland around 2159 UT (local sunset).

The KNR website is Greek...er...Greenlandic to me. With a little exploring I might find a link for streaming audio; however, to hear a sample of the Greenlandic language, try this link: www.knr.gl/index.php?id=736 I find the language sounds very similar to the Inuktitut spoken across the Davis Strait in Canada.

❖ Iceland

Moving eastwards, we next arrive in Iceland. For many years, Iceland was known to DXers for its broadcasts intended for the Icelandic fishing fleet. Over the years I logged these a number of times, but only tentatively. Sadly, these ended on July 1, 2007. Iceland can be heard online, however, at www.ruv.is/

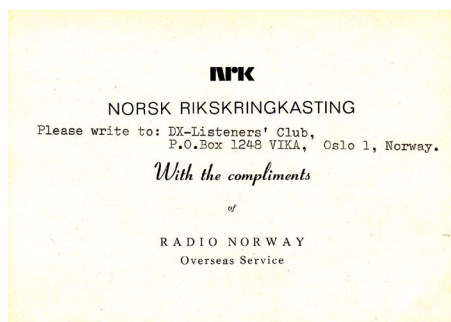
"Ríkisútvarpið RUV – The Icelandic National Broadcasting Service – is an independent public service broadcaster, formally owned by the Icelandic state." You can access RUV's radio channels at: www.ruv.is/heim/english/english/

Channel 1 features classical music and documentaries, 24 hours a day. Channel 2 offers pop music and current affairs, 24 hours a day.

❖ Norway

Continuing eastward, we arrive in the homeland of my grandmother's ancestors: Norway. My father could speak a little bit of Norwegian as a child, which he used when he spoke to his grandparents. By the time I first heard Radio Norway in 1979, he had long forgotten it all, but he did recognize the sound of the language and liked to hear it.

The NRK, Utenlandssendingen, began transmissions on the shortwave bands in 1948.



Initially broadcasting in Norwegian, English language programs were later added. The service was discontinued on January 1, 2002. All NRK broadcasting activities on shortwave ceased on January 1, 2004.

NRK's mediumwave transmitter at Kvitøy on 1314 kHz used to be widely heard internationally and was one of the most commonly heard transatlantic DX signals in eastern North America. The frequency carried a mixture of NRK's radio channels P1 and P2, and was called Europakanalen. However, these mediumwave transmissions were discontinued on July 1, 2006.

NRK claims to have the longest running radio show, *Lørdagsbarnetimen* (literally, *The Saturday Children's Hour*), running since December 20, 1924. http://en.wikipedia.org/wiki/Norwegian_Broadcasting_Corporation

"NRK P1 is Norway's largest radio station, with almost two million listeners each day. Regional reports, news, current affairs, public service material and music continue to be the main ingredients in the recipe that makes P1 Norway's first choice among radio listeners.

"NRK P2 is a cultural radio station. Cultural material makes up most of the programs offered, which consist of news, debate programs, analyses and social commentary.

"NRK P3 is mainly aimed at young people in the 15-30 age bracket. NRK P3 is a broad-spectrum radio station for young listeners between 0600 and 1800 hrs and more of a cultural pop and rock station during the evenings and at night. P3's main emphasis is on music, comedy/entertainment and news for a younger audience."

Other channels include:

"NRK Gull (Gold) is based on NRK's abundant archives, dating back to the company's first radio broadcasts over 70 years ago and continuing up to the present. NRK Barn (Children) is available all day on DAB and the Internet, and addresses children. Its content consists of a mixture of new and old material presented by its own program presenters. NRK 5.1 is aimed

at a discerning public seeking a perfect listening experience. NRK 5.1 is the world's first online radio channel to offer so-called multi-channel 5.1 sound.

"**NRK Klassisk** (Classical) plays classical music 24 hours a day. It was the first station of its kind in the world. **NRK Alltid Nyheter** (News) obtains news and reports from the rest of NRK and presents them on one station. **NRK Folkemusikk** (Folk Music) is helping make NRK's unique folk music archives accessible to a greater number of people. NRK mP3 is a pure music station that plays energetic music 24 hours a day. It was launched on 31 July 2000, and is produced at Tyholt in Trondheim.

"**NRK P3 Urørt** (**P3 Untouched**) Urørt is P3's demo competition for non-established bands based on the Internet, radio and NRK 2. P3 Urørt is an online radio station that serves up the best tracks from the Urørt database 24 hours a day. This channel was launched in February 2005." http://fil.nrk.no/informasjon/about_the_nrk/1.3607220

Access these streams and more at: www.nrk.no/radio/

❖ Sweden

Our next stop on our trip through Scandinavia is in Sweden. Radio Sweden is still broadcasting via shortwave in English and other languages, making it unique in the region.

Radio Sweden offers a daily email with the next days' program highlights.

Here in North America, your best bet to hear Radio Sweden is at 0130-0200 and 0230-

0400 via the Sackville, New Brunswick transmitters of Radio Canada International.

For those of us in Canada, **CBC Radio One** listeners can listen to Radio Sweden broadcasts on the radio or via the CBC website, during the **CBC Overnight** programming block. Radio Sweden can be heard weekdays at 2:00 am local time, and weekends at 3:00 am local time. You can find CBC local streams through www.cbc.ca/overnight

Radio Sweden programs are available online via the Radio Sweden website. In fact there is a 30-day archive of programs. Check www.sr.se/rs/english/. These programs can also be downloaded as a podcast via iTunes or your favorite podcatching program. And it can be heard via the World Radio Network via satellite and online.

Monday to Thursday, one can hear "**Radio Sweden daily edition**." According to the website, "Radio Sweden is committed to its goal of being the best source of information about Sweden in English with relevant, interesting and thought-provoking programs for Sweden's culturally diverse society, its expatriate community, Swedes abroad and 'Swedophiles' around the world."

Each day, the listener gets a jam-packed half-hour program, looking at all things Swedish. It would probably be nice if they picked up the slack with news of their neighboring Nordic countries, not that they are required to make up for cutbacks abroad.

A careful listen reveals a surprisingly multicultural nation – Surprising, because I had no idea of the extent to which Sweden is a major destination for immigrants and refugees in Europe.

Expanding on this theme, on Fridays, Radio Sweden presents **Inside Sweden**, "carried on the national P2 network Fridays at 13:30 hrs local times as well as on shortwave, (which) connects Sweden to the world and new immigrants to Sweden.

Radio Sweden Weekend is a review of the week: "Each Saturday and Sunday we bring you a round-up of the week's main stories and talk to the people who shaped them – from government ministers to the Swede in the street. What's happening in this country's social, cultural, political and entertainment scenes? If you missed a program during the week – catch up with Radio Sweden on Saturday or Sunday!" www.sr.se/rs/english/index.htm

From the same web page, one can access the four domestic radio networks of **Sveriges Radio**:

P1, "the spoken channel" for current affairs, science, culture etcetera (similar to BBC Radio 4 and ABC Radio

National)

P2, broadcasting classical music, folk music, jazz and world music as well as programs in minority languages (similar to BBC Radio 3)

P3, broadcasting music and comedy targeting a younger audience (similar to BBC Radio 1 and Triple J)

P4, made up of 25 local stations broadcasting locally for much of the day. Targets a more local audience and also broadcasts sport. http://en.wikipedia.org/wiki/Sveriges_Radio

❖ Finland

Before circling back, Finland is our next destination. Like most of the other Nordic countries, Finland abandoned shortwave in 2006. YLE Radio Finland used to be a very reliable catch in English and Finnish, and was heard via the **CBC Radio One Overnight** program as well. Nowadays, one can hear Radio Finland news in English online via <http://areena.yle.fi/hae?pid=1101614>

You can also access Finland's unique Latin broadcast at: www.ylerradio1.fi/nuntii/

❖ Denmark

To end our trip to Scandinavia, we circle back to one of the best-kept secrets in radio...

Radio Denmark. I had heard Radio Denmark once or twice over

the years, when they had a shortwave program. English was

DR

dropped years ago, and in the last years of the service, Danish was broadcast via Norwegian transmitters. Eventually this, too, ended.

While researching this little tour, I stumbled onto a real gem...the Danmarks Radio website.

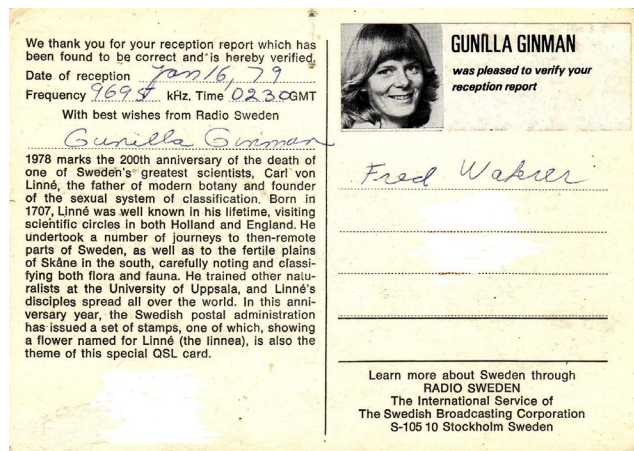
"DR Radio comprises four FM-stations:

P1, **P2** (classical music and culture), **P3** (young people) and **P4** (eleven regional stations). Since 1996 DR has transmitted radio on the Internet, including daily transmissions of *Radioavisen* (news) and *Orientering* (current affairs magazine). In 1999 DR introduced a new activity, **DR Classical** (with P2 and other classical music around the clock), which is accessible via satellite dish reception or cable and on the Internet. In 2008 DR also offers 15 radio channels on DAB (Digital Audio Broadcasting) and nearly 30 channels on the Internet." www.dr.dk/OmDR/About+DR/20060622150803.htm

This last statement is the key. There are many audio streams, just a click away from the listener, that I have quite frankly fallen in love with. Just about any musical genre you can imagine is available here. I am particularly enamored with **DR Folk**. But there are different kinds of Rock, Classical, Jazz, Dance, R & B and my other favorite, **DR World**.

I listened the other day to **DR World** for a couple of hours. Wow. What an amazing variety of music. One minute you are listening to Klezmer, the next to a Samba, and next, African "High Life." It may just be my new favorite "go to" music stream.

You can access these channels at: www.dr.dk/radio/alle_kanaler/?v Music your ears will thank you for!



Gains and Losses for SWLs

RUI Lays Off its DX-Editor

Alexander Yegorov wrote in open_dx via midxb (and translated from Russian by Sergei S.), for *DX LISTENING DIGEST*: Farewell broadcast of my DX-program *Whole World on the Radio Dial*, #161 started airing Feb 21. Its future will depend mostly on whether I'll be able to negotiate part-time work at RUI. Due to my leaving National Radio Company of Ukraine (NRCU), my email address changes to aseg@rambler.ru

Producing an English language program has never been easy for me. I am not a linguist or professional narrator. The most unfortunate part is that RUI's director publicly spoke against my DX-program. In reality he never listened to it since he doesn't understand English. But he confidently pronounced that no one needs it and that my position should be taken up by a specialist in politics and information.

Walt Salmani, BC, comments: Alexander was an excellent source for developments in the media scene, especially radio, in Ukraine. At times his English was a little difficult to follow, but no matter. Another DX program bites the dust. Another nail in the coffin of international shortwave? But Sergei adds: I'm pretty sure

Alexander will continue providing the international DX-community with local news.

The Happy Station Revived, Not from Radio Netherlands

Keith Perron, who formerly worked for RCI, RHC and CRI, and now resides in Taiwan, has revived *The Happy Station* as a fun listener-contact show along the lines of the old R. Nederland production hosted by Eddie Startz, and later Tom Meijer. Keith even sounds rather like Tom; now scheduled on WRMI 9955, UT Thursdays 0100-0155 and 1500-1555.

Between the two first airings on March 12, word arrived that Dick Speekman, former host of *DX Jukebox* on RN and *Spectrum* on RA, had died in South Australia, so Keith re-edited the repeat to include a final greeting previously recorded from Dick.

Exact plans kept changing, but at press time, it appeared different HS editions would be on those two broadcasts, there would also be one in Spanish on alternate weeks, and additional shortwave airtimes were being sought via South Africa and perhaps Singapore.

Meanwhile, webcasts and podcasts are also available. Latest plans should be found here: <http://groups.yahoo.com/group/thehappystation/>

AFGHANISTAN Visiting Kandahar in late February to set up internet service at the base, I found the remains of Radio Solh, a fixed frequency dipole, roughly about half-wave at 6700 kHz along with its antenna tuning unit, a sealed container where the transmitter lies and the transmission cable buried underground. I have been told that the studios, etc., have already been dismantled and removed (Al Muick, Kandahar Air Base, *DXLD*)

BENIN In *WRTH* 2009, TWR Parakou lists a 100 kW SW transmitter. Does anyone know if this one is already in operation? (Johann Wiespointner, Austria, *DSWCI DX Window*) TWR Benin (MW 1566) has no license yet for shortwave. They are hoping it will be granted during 2009. After the license is secured, it will take a year or more for fund-raising and constructing (Jari Savolainen, Finland, *ibid.*)

BIAFRA [non] After some months at 2000-2100 Fridays via WHRI 15665, V. of Biafra International moved one hour later on March 13, to 2100-2200, still confirmed on 15665, though The Orator thinks he is on "15.67 MHz" and the VOB website thinks it's on 15.28 MHz at 2000. So wrong time, wrong frequency, but hey, close enough for anti-government work! In A-09, this was supposed to move to 17650 at 2000-2100 again on Fridays but not to be believed unless confirmed (gh)

BOLIVIA See *GUATEMALA*

BRAZIL Last month's item about RNA spurs on 11730 and 11830, audio dropouts should have been attributed to (gh)

BULGARIA R. Bulgaria A-09 English adds two daily broadcasts in DRM: WEu 1730-1800 on 9395-9405, NAm 0200-0300 9495-9505. So even in DRM, RB maintains its curious policy of only using center frequencies ending in 00! Analog English:

WEu 0630-0700	9600, 11600
1130-1200	11700, 15700
1730-1800	5900, 7400

NAm 2300-2400 and 0200-0300	9700, 11700
--------------------------------	-------------

(gh, from full sked via Jaisakthivel, India)

CAMEROON 6005, at 0730 18 Jan, R. Cameroon using BBC's channel, English, SINPO 32323 (Dzever Ishenge, Nigeria, World DX Club *Contact*) BBCWS Ascension closes 6005 at the odd time of 0706* after news. Perhaps it would be worth staying tuned. Ishenge reported this last May at 1400, and in July another listener in Nigeria confirmed Buea 6005 was on the air, heard from 1455 until blocked by BBC at 1700. But not a single report since. This may be another African whose daytime-only signal doesn't manage to escape the continent (gh)

I am still hearing Cameroon on 6005 most days, audible when the channel is otherwise clear, 0706 to around 1700. Signal strength weak and audio always low and distorted making most speech unintelligible (James MacDonell, Nigeria, mid-March, *DXLD*)

CANADA Every so often someone reports a

station on 6160 which isn't supposed to be there. If late at night in NAm, it's a lineup of stations WRN supplies to *CBC Overnight*, via CKZN Newfoundland and four hours later repeated on CKZU Vancouver. Check the current schedule where local DST conversions to UT are -3 and -7 respectively: www.cbc.ca/overnight/schedule.html

At times one can hear both stations, making a fast subaudible heterodyne with each other, with same programming echoing only during news on some hourtops (gh) CKZU on 6159.97 around 0300 (Ron Howard, CA, *DXLD*)

[and non] In early March we found CFRX, 6070, Toronto lacking the usual heavy interference from CVC Chile all-night, such as at 0748 during the *Holder Tonight* talkshow originating at CJAD Montreal.

Excellent news: (gh)

CHILE CVC La Voz finally dropped 6070 during most of the night, Spanish there reduced to 0000-0100 and 1100-1200 only; however, during A-09, still using 6070 during prime-time 2300-0200 only. A few months after canceling its all-night service in Portuguese, CVC did the same with Spanish, apparently no longer cost-effective, and surely not in deference to CFRX. CVC also dropped 11805, 11970 and 9655 (gh)

CHINA Voice of Strait, Fuzhou, 4940, has Sunday-only English half-hour at 1500, *Focus on China* with a series of one minute news items about China, alternating between Gary and a woman announcer, musical bridges; mixing with AIR Guwahati (Ron Howard, CA, *DXLD*)

Voice of Jinling-Jinling zhi Sheng on 5860 expanded time from 1130-1400 to 0100-1600; includes English ID as Jiangsu Radio Impassioned. QRM from R. Farda at 0830-1400 (Hiroshi via S. Hasegawa, NDXC, *DXLD*) Heard in the clear 1400-1500 only, then R. Free Asia and heavy jamming (Ron Howard, CA, *ibid.*) Interference situation different in A-season, and Jinling might need higher frequency in daytime (gh)

Also in February, CRI News Radio - *Huanqiu xixun guangbo*, on AM and FM in Beijing, heard on new SW relay via Kashi at 1200-1400 on 9665, 11790.

► <http://newsradio.cri.cn/> (Hiroshi via S. Hasegawa, NDXC, *DXLD*) Heard with news in Chinese but English ID at 1300, also in webstream and satellite (Ehard Goddijn, RNW, *Media Network* blog)

CRI and China National Radio put programs on shortwave as a way to jam foreign broadcasters. With the National People's Congress, jamming is 5 times more than at normal times. CRI broadcasts its domestic service over shortwave in Shanghai, Shenzhen, Beijing and others. Why broadcast on SW to these cities which already have MW and FM frequencies? The purpose is to jam Chinese broadcasts from VOA, BBC, Radio Free Asia and others (Peter Sabrie, *ibid.*) But nothing being jammed on 9665, 11790 (Andy Sennitt, *ibid.*) However, 9665 collides with P'yongyang on 9666v (gh)

In Beijing and Shanghai you cannot tune to the SW bands without hearing either: CRI, Beijing People's Radio, China National

*All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; sesqui = one and a half; A-09=spring/summer season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated*

Radio, Beijing Traffic Radio (why put a traffic station on shortwave? It is just too funny!). Right now I am hearing Beijing Traffic Radio clear as a bell on 9545, 9760, 11540, 11860, 13520, 15180.

I have lived in Beijing for 12 years and know all the tricks used by the Ministry of Propaganda. Last May, all of a sudden on SW was Shanghai Children's Radio. Then two weeks to the day when the People's Political Consultative ended, so did the 12 frequencies they were using (Peter Sabrie, *ibid.*)

On 6065, *English Evening* program via CNR-2/China Business Radio, announced schedule change to M-F 1330-1400, Sat/Sun 1300-1400, as I have been reporting (Ron Howard, CA, *DXLD*)

CNR-8, the minorities service, *Minzu zhi sheng*, greatly expanded in March, 2200-1700, usually in two languages at once, alternating Korean, Mongolian, Uighur, Kazakh, on several sets of frequencies; also Tibetan [q.v.] split into a separate CNR-11 service (Hiroshi via S. Hasegawa, NDXC, Japan, *DXLD*)

Detailed frequency lists now available, including: "2009 List of Domestic Shortwave Stations in Chinese Mainland" www.5bcl.com/Article/Class3/200903/3126.html (Takahito Akabayashi, Japan, *DXLD*)

CONGO DR [non] Radio Kimpwanza in Lingala, new station via TDP: 1700-1800 Sundays on 15260 via Samara, Russia, 250 kW, 188 degrees to C Africa (*DX Mix News*, Bulgaria) Nothing audible March 8 or 15; propagation? (Noel Green, England, *DXLD*) Or started later? (gh) Website is

🔊 www.radiotvimpwanza.net/ (José Miguel Romero-2, Spain, *ibid.*) Beware: loud sound launches automatically; how rude! (gh)

Links to another website www.rplc-rdc.com of the "Rassemblement des Patriotes pour la Libération du Congo" (RPLC), so seems weekly broadcast is to DR Congo in support of that group. Gives contact address of 106 North Denton Tap #210-362, Coppell, Texas 75019, contact@rplc-rdc.com (Tony Rogers, BDXC-UK)

CUBA [and non] Radio República again suspended broadcasts via WRMI at end of February, reviving a relay presumably Sackville, at 2300-0400 on 9810. As it was announced in advance on WRMI, the Cuban Jamming Command was already there and for good measure jammed 9810 at other hours, too (gh)

A sampling of SNAFUs at RHC: 17705 in Portuguese before 2230, then French, supposed to be Guarani, with crackling, both modulation and signal strength jumping up and down but not completely off, like a loose connection or short in the antenna system, blowing in the wind.

One night between 0535 and 0700, the English frequencies 6140 and 6060 were switching into Spanish and even Portuguese instead. (gh) Also heard English instead of Spanish at 1310-1320 on 6000 (Kenneth Vito Zichi, MI, *MARE Tipsheet*)

ERITREA [non] More to last month's item: First broadcast of R. Asena heard Monday Feb 16 at *1731 on 0610, political talk in Tigrinya about Asena (often mentioned) and Eritrea, 44333, QRM RCI in English 9610 (Anker Petersen, Denmark, DSWCI *DX Window*) Mon, Wed but Fri in Arabic (*Eritrea Daily via Media Network blog*)

Got a very nice, personal letter in English, confirming reception of Voice of Asena on 9610 the first day. Director and founder Amanuel Eyasu says I was first to send feedback through a detailed report. When you say "Asena" to a person it means "that you are happy about something," so I say "Asena" to you all. Website: www.asenna.com [not a typo] Email to the station: aseye.asena@googlemail.com (Björn Fransson, Gotland, *DXLD*)

FRANCE Re sked last month: I can confirm from my conversations with David Page of RFI English that there are no morning English broadcasts on the weekends (Mike Cooper, *DXLD*) So 04, 05, 06, 07 are UT M-F only

GABON Africa No. 1 says absence of 15475 and 17630 is temporary. In reply to an e-mail I sent to the engineering address at the end of the Flash movie on ANO's Web site which provides details of their shortwave transmitters, head of their FM transmission department said there was a major breakdown in the IML transmitter (15475) and are waiting on replacement parts, difficult to find. The situation isn't helped by the current business situation. As for 17630, CEOCOM technicians are working to get that frequency back on. ANO noted that 9580 is still on, intended for central Africa, so we do well to receive it at all in the United States (Mike Cooper, GA, *WORLD OF RADIO*)

GERMANY [non] Our picks of DW A-09 English broadcasts, all to elsewhere, which could be heard in NAM (gh)

0000-0100	15595 Vladivostok, 17525 Komsomolsk
0300-0400	15595 UAE
0400-0500	7245 Rwanda, 7430 Portugal, 12045 UAE
0500-0530	7430 Portugal, 9440 UK, 9700 Rwanda, 9825 RSA
0600-0630	7310 Portugal, 15275 Rwanda
1600-1700	15640 UK
1900-1930	11795 UK, 17860 Portugal
2000-2100	11795 UK, 11865 Portugal
2100-2200	9735 Portugal, 11865 and 15205 Rwanda [probably best]

(from a complete A-09 schedule via Alokesh Gupta, India)

A report from Deutsche Welle to Germany's federal parliament: <http://dip21.bundestag.de/dip21/btd/16/118/1611836.pdf>

Basically it is a plea for more money, specifically a budget increase against 2009 of 20.6 MegaEuro for 2010, 41.4 for 2011, 59.1 for 2012 and 78.2 for 2013. Some points:

Program content about Germany itself is considered convenient only if relevant for target audience. A "limited amount" of other stuff about Germany could be added as "additional service" for those who happen to be interested in Germany.

English, Arabic and Russian will be broadcast in different regional versions. English will have to be ready to provide immediate coverage in

breaking news.

In the DW A09 schedule, reduction of shortwave airtime for German and Russian is quite obvious (Kai Ludwig, Germany, *DXLD*)

One used to hear a variety of accents in English; I noticed the S Asian service speakers already all had S Asian accents. Perhaps the powers that be at DW have lost touch with their raison d'être and instead are more interested in ... giving BBC and VOA some competition, which really cannot be a bad thing (gh)

Probably wouldn't be difficult for DW to compete with VOA in some areas, given general mistrust of US foreign policy, but I doubt whether DW or any other international broadcaster will ever be able to overtake BBC World Service.

Selling German achievements in culture, trade and technology, showcasing its language and tourist potential, ought to be the unique selling point, thereby giving the German taxpayer value for money, and the international audience something different to listen to (Roger Tidy, UK, *DXLD*)

GREECE In early March, John Babbis in Maryland, who monitors V. of Greece every evening, and I noticed that 9420 was missing, no longer colliding with CVC Zambia until the latter closed just after 2200, as had been happening since October, but VOG came on 9420 at 2300. 15650 also went off the air two hours earlier at 1352, so no longer colliding with Miraya FM via Slovakia for Sudan [q.v.] at 1500. John eventually got word from VOG: (gh)

I have very bad news that explains the silence of our transmissions. One of the Avlis transmitters is severely damaged and because of this, only two (instead of three) simultaneous transmissions are possible. The scheduling of Radio Station of Macedonia is unaffected (Demetri Vafeas, ERA, via John Babbis, *DXLD*) Most of the remaining operations were to be on 9420, but actual usage varied (gh) Evening monitoring found 7450 switching to 9420 at 2300; and 7475 from 2000 until 0300 (Babbis, *ibid.*)

GUATEMALA [and non] Ulysses Galletti in Brazil thought he was hearing R. Amistad, Guatemala on 4699.3 at 2245 on February 7, although he did not get an ID, and sent them a report. A reply came from David Daniell of Missionary Broadcasting, Inc., www.mbimedia.org and <http://www.missionarybroadcasting.blogspot.com/> in Mobile, AL, an advisor to the Baptist station, saying that the engineer had been making some repairs although not until Feb 12, in order to return to SW after a long time off. The correspondence in full, in Spanish was put on the *radioescutas* yahoo group.

It's not clear if Ulysses ever was aware there is a much closer Bolivian on 4699.3 that he must rule out, lacking a definite ID. There have been no reports of R. Amistad being heard in nearby North America, where it would surely have been noticed if on.

But R. San Miguel, Bolivia, has been reported not only by other Brazilian listeners, but also from NAM, as presumed since no definite ID was obtained either (gh) 4699.34 at 0107-0115+ and 1032-1101+, with a Catholic program (Harold Frogge, MI, *DXLD*)

And the same date, presumed on 4699.34v, R. San Miguel, Riberaltá, 0111-0227* and 0904 to fade-out; steady on 4699.34 until 0227 s/off, poor. S/on at 0904 on 4699.353 and slowly drifting down to 4699.346 by 1045 where it remained steady until 1130 carrier f/out. Peaking around 1028 sunrise at transmitter with talk by male speaker, then fading rapidly (Brandon Jordan, TN, Perseus SDR, *DXLD*)

INDIA AIR National Channel on 9425 surprised us with more English than expected, at least per Aoki listings, 500 kW, 18 degrees from Bangaluru, with 5 minutes of English [news] at 1430 and 1530, otherwise in Hindi at 1435-1530, 1535-1630, and the same pattern through the night. But on two consecutive Mondays, 9425 stayed in English after 1435, apparently with instructional programming, announced as on two 9 MHz frequencies only, the other probably 9470, so cutting away from the national network also on numerous MW and FM frequencies. One Monday there was another English extension past 1535, but neither happened on Tuesday. No program schedules are to be found on the AIR website (gh)

IRELAND [non] After a one-day test in January, barely audible then in NAM, RTE began on St. Patrick's Day a daily SW relay provided by WRN via South Africa, for thousands of Irish working in Africa, many of them without internet or satellite access; on 6220 at 1930-2030 UT. That's 7:30 pm at Ryan's Bar in Accra, Ghana and 10:30 pm at O'Willies Pub in Dar-es-Salaam, Tanzania. RTE had ceased SW relays in 2004 (WRN press release) Except for some sporting specials each September. However, RTE is also on WRMI's relay of WRN, M-F at 1800-1830 and 2100-2130 on 9955, both containing the *Drivetime* news roundup (gh)

JAPAN NHK has some neat programs we can only run across in its Japanese service, lacking an English translation of their Japanese program schedule, such as UT Friday at 0720 direct on 6145 and 6165, one with a title half English-half French, *Sound Passage*, starting with a jet-engine sound. There are gems like this involving music or sounds, which can be enjoyed without speaking Japanese, if only we knew about them (gh)

KOREA NORTH [non] Alternate frequencies available in A-09 for JSR, Shiokaze/Sea Breeze daily at 1400-1430: 5910, 6020, 6070, 6075, 6120, 6125. In B-08 it switched every few weeks between 5910 and 5985. On Fridays, sometimes Wednesdays or other days in English (gh)

MALAYSIA In early March, the RTM Sarawak transmitter on 7270 was slowly drifting upward, a good thing, getting further away from Chinese interference; first on 7270.36 March 2, up to 7270.40 on March 5, monitored between 1245 and 1430 UT, but best reception 1400-1430; on March 8 it corrected back to 7270.0 but March 12 up to 7270.45. Station relayed switches at 1403 from Limbang FM to Wai FM.

🔊 Audio streaming at <http://www.rmsarawak.gov.my/>
Also heard: 6099.71v, Voice of Malaysia, 1351-1459*, 1358 "Suara

Malaysia ID followed by distinctive choral Anthem (*Negaraku - Lagu Kebangsaan Malaysia*), more pop songs, 1457 ID, choral Anthem and off; assumed in scheduled Thai (till 1400) and then Burmese.

7130, Sarawak FM via RTM, 1342-1400, Mixing with CNR-2/CBR (with *English Evening*), both about same strength; DJ in vernacular playing pop songs. Was doing well till covered at 1400 by sign-on of CNR-1 which started echo-jamming Taiwan; // 5030 with CNR-1 QRM. Well above average reception for Sarawak.

7294.97, Traxx FM via RTM, 1616-1628, Shaz with his late night show of pop songs; fair (Ron Howard, CA, *DXLD*)

NETHERLANDS [non] When cutting off SW to North America in English last year, RN claimed to still be getting huge response to its Spanish broadcasts on SW, which therefore would continue and take over hours that had been in English. But in A-09, transmissions to SAm south of the Amazon are also deleted. Spanish to further north continues, including a new relay via Greenville on 9450 at 2300-2400 for Cuba which could carry on into South America, and some Bonaire and Portugal relays should also leak into deep SAm, which RN could still claim to serve if they wanted to.

RNW complete A-09 of what's left in English, actually from 1 minute before the start-hour to 3 minutes before the end-hour, with site, azimuth, kW:

10-11 KHB 12065 218 100 E China
PHT 15110 283 250 E Asia
TIN 11895 267 250 E & SE Asia
14-15 TAC 9345 131 100 SE Asia/India
14-16 MDC 11835 50 250 S Asia
MDC 15815 35 250 S Asia
TAC 7530 131 100 SE Asia/India
18-19 MDC 6020 255 250 S Africa
18-20 WER 15535 150 500 E Africa
19-20 DHA 9480 215 500 E Africa
ISS 11660 183 500 W Africa
NAU 15335 183 500 W Africa
19-21 MDC 5905 305 250 E Africa
MDC 7425 270 250 C & S Africa
20-21 ISS 11610 183 500 W Africa

Bonaire is still on the air but not with any English from RNW, which had been at 20-21 on 17810.

Site key: KHB = Khabarovsk, Russia; PHT = Tinang, Philippines; TIN = Tinian, N Marianas; TAC = Tashkent, Uzbekistan; MDC = Talata, Madagascar; WER = Wertachtal, Germany; DHA = UAE; NAU = Nauen, Germany; ISS = Issoudun, France (gh)

NIGERIA [non] Aso Radio in Hausa, from March, new morning transmission M-F 0530-0600 on 7385 via TDP, Samara, Russia, 250 kW, 188 degrees to CAf (*DX Mix News*, Bulgaria) Audible here mentioning Nigeria; may or may not have continued same in A-09 (gh)

PERU 4805, New Peruvian! 2235 UT, Radio Rasuwilca, Ayacucho, QTH: Faldas del Cerro La Picota, Ayacucho. I hope they give their phone number so I can call them (Alfredo Cañote, Lima, *condiglist* yg)

No further reports; *WRTH* 2009 listed on 4805 as active: Radio San Juan, Huamanga. Googling a bit, seems that *Rasuwilca* is the name of a mountain peak, and possibly a deity to some (gh)

PHILIPPINES 9570 at 1540, nice classical organ music, 1544 Russian ID for Radio Blagovest, sermon in clearly enunciated Russian; 1554 ending, banging bells, ID again; 1555 R. Veritas Asia ID by YL in English, said next broadcast would be in Vietnamese, but 9570 off at 1555:40*. Aoki shows 1500-1557 on RVA in Russian is R. Blagovest, 250 kW, 331 degrees. *WRTH* 2009 does not mention that name under the RVA listings; it's just a program title. The word refers to Russian Orthodox music, bells in particular. But RVA is Catholic! (gh) Radio Blagovest is indeed a Catholic program, but intended for wider audience. It used to be aired via TWR Monte Carlo back in the '80s, and the programs were produced in Brussels. At present they are recorded in Russia, I guess. Blagovest is a type of bell-ringing (Sergey Nikishin, Moscow, *DXLD*)

ROMANIA One change to the RRI A-09 English schedule last month: 0000-0100 on 6135, not 11790 (gh) Program previews: *THE WEEK AHEAD*: www.rri.ro/art.shtml?lang=1&sec=24&art=19577 (Harry Brooks, North East England, UK, *DXLD*)

RUSSIA Starting March 29, VOR going through major changes, both output increases and numerous language cuts. World Service in English becomes a 24x7 service again! ex 16 hours daily. Spanish and Kurdish hours double; German, Serbo-Croatian and Hindi increase by 30 minutes each. VOR's Russian World Service and *Sodruzhestvo* (Commonwealth) Service merge into one, round-the-clock channel. Russian International Radio (pop-music and news service) continues as a stand-alone 24x7 channel.

About a third of VOR's language services shut down, including Albanian, Bengali, Bulgarian, Czech, Finnish, Greek, Korean, Norwegian, Romanian, Slovak, Swedish, Urdu and Vietnamese. Some of those were over 50 years old (*Dxing.ru* via Sergei S., Moscow, *DXLD*)

These sudden cuts led to great strife in the VOR building, as numerous staff would suddenly lose their jobs; at press time the outcome had not been resolved (gh)

SAUDI ARABIA BSKSA with heavy buzz on strong 17805, covering 17801-17809 at 0900-1200 (Wolfgang Büschel, Germany, *DXLD*) Same transmitter still doing it too on 15435 after 1500 in mid-March; We dub it '*Sout ul-Buzz*' (gh) With a Perseus, I sum up my findings in a short and richly illustrated paper: <http://web.mac.com/nils.schiffhauer/Website/H%C3%B6ren/H%C3%B6ren.html> Also a short video for listening and viewing the world champion in chainsawing its own transmission (Nils, DK8OK via Perseus YahooGroup via *SW Bulletin*)

SIERRA LEONE [non] Tentative A-09 for *Cotton Tree News*, daily 0730-0800: 15220, 250 kW, 189 degrees from Rampisham; ex-11875 in B-08. Its companion *Star Radio* for Liberia at 0700 was canceled earlier (gh)

SUDAN [non] R. Dabanga service for Darfur, by Press Now, Netherlands, A-09: 0430-0527 13800 UAE, 13840 Madagascar; 1530-1727 11500 Madagascar, 13730 Wertachtal (RNW schedule)

Interviewed on RCI, Jean-Claude Labrecque, former Radio Canada journalist and now head of Media and Editor-in-Chief at Miraya FM, said the indictment of Bashir had not caused any problems for his station, and planned to double SW time to Darfur later this year to six hours a day. Schedule via Slovakia remains 1500-1800 on 15650, usually the first few minutes in English; and Greece's breakdown cleared the frequency (gh)

TIBET [and non] Tibetan service of CNR-8 (Voice of Minorities) was separated and became CNR-11 from March 1. SW sked:

6010 2155-2400, 1030-1605
7350 0900-1605
7360 2155-2400
9480 2155-0100, 0800-1605
9530 0000-1030
11685 0000-0900
15570 0100-0800

Includes English program:

0530-0600 9530, 11685, 15570
1430-1500 6010, 7350, 9480

(Hiroshi via S. Hasegawa, NDXC, *DXLD*)

Monitored several of these at 1430, best on 6010. What CNR-11 has done is take the *Holy Tibet* programs, which I assume are produced by PBS Xizang in Lhasa, deleted the H.T. IDs at the start and finish of the programs and instead inserted canned IDs as "*China National Radio, Welcome to our English program from Tibet*" (Ron Howard, CA, *DXLD*)

TUNISIA With evacuation of broadcast stations from 7100-7200, RTT's 7190 is replaced by 7335 available at 0400-0800, still // 7275; 7345 at 1700-2400, but actual hours are probably somewhat shorter (gh)

TURKEY [non] For at least the first half of March, VOT's Sackville relay at 0400-0500 on 7325 was not in English as scheduled, but Turkish(?) because of a satellite feed channel mixup, slow to be resolved, despite our prompting. By now it may be back in English at the summer time of 0300 (gh)

USA Anyone who took the tour of VOA headquarters in the 1974-1994 period probably met Margaret Jaffie (Dan Ferguson, SC, NASWA yg)

Margaret Jaffie, who welcomed tens of thousands of visitors to the Voice of America at its Washington headquarters, died Feb. 12, in Sun City Center, Florida, after a heart attack. She was 88. Ms. Jaffie, who received a Congressional Award for Exemplary Service to the Public in 1985, was one of Washington's best known tour leaders. Over two decades, she walked more than 100,000 miles in leading visitors through the corridors of VOA up to five times a day. Ms. Jaffie soon learned to wear tennis shoes as she led them past studios and master control to observe live broadcasts to every corner of the earth. Upon her retirement in late 1994, her colleagues presented her with a pair of tennis shoes dipped in gold (via Ferguson, *ibid.*)

KVOH, 17775, was again heard several afternoons in March around 2030-2130, providing us eight frequencies for the price of one! Strong, dirty FMy spurs at 144 kHz above and below, and weaker multiples of that, audible on: 17199, 17343, 17487, 17631, 17919, 18063, 18207. 17631 severely interferes with French Guiana at 2100 in Spanish.

Why hasn't RFI or aeronautical interests on 17921 or maritime interests impacted by 17199 and 17343 complained? Does no one care but yours truly? These spurs have been heard repeatedly since 2005; the transmitter is surely a piece of crap, which ought to be overhauled or dumped (gh) It's a 40-year-old rig, thrown out by HCJB more than 15 years ago and replaced by their own HC100 model (Kai Ludwig, *DXLD*)

Defunct KAJI is finally off the books in FCC scheduling. 5755 and 9480 are now officially assigned to WWCR, but only a holding pattern for George McClintock's new SW station, 0000-1200 on 5755, 1200-2400 on 9480 (gh)

An *Earth Day* special is planned for UT April 23 at 0100-0300 on WRMI, 9955, following a previous one a month earlier. Sponsored by www.101angels.com (Jeff White, WRMI) They always read this column as soon as the pdf comes out (gh)

WRMI relays of WRN reexpanded to 8 hours a day, M-F at 1600-2400 on 9955. Let's have no mystery loggings of unexpected stations here: 1600 NZ, 1615 Vatican, 1630 Slovakia, 1700 Poland, 1730 Netherlands, 1800 Ireland, 1830 Prague, 1900 Sweden, 1930 Australia, 2000 Poland, 2030 Korea South, 2100 Ireland, 2130 Romania, 2200 Netherlands, 2300 Russia, 2330 Israel. These can be replaced if some or all of this time is sold again to Cuban exiles or other broadcasters (gh)

ZAMBIA CVC Lusaka, 1Africa in the 315 degree service toward Nigeria and Michigan, tentative A-09: 05-06 9430, 06-19 13590, 19-22 5940 – the last finally resolving the B08 collision with Greece on 9420, but look out in B-09 – assuming ERA gets back to full transmitter usage (gh)

ZIMBABWE [non] R. Voice of the People, via Madagascar A-09: 0400-0500 9895, 1700-1800 7395.

Madagascar also relays VOA's *Studio 7*: 1700-1800 on 11605 (RNW schedule)

SW Radio Africa at 1700-1900, A-09 tentatively on 12035 via Rampisham, UK, ex-Woofferton 11745 (Wolfgang Büschel, BC-DX)

Zimbabwe Community Radio launched 1 March at 2000-2100 daily via UAE on 5935, changed to 5995 for A-09; 2000 in Ndebele, 2025 English, 2045 Shona; 5935 was audible here with difficulty (Jari Savolainen, Finland, *DXLD*)

Until the Next, Best of DX and 73 de Glenn!

BROADCAST LOGS

NOTEWORTHY LOGS FROM OUR READERS

Gayle Van Horn, W4GVH

gaylevanhorn@monitoringtimes.com
http://mt-shortwave.blogspot.com

0000 UTC on 7325

AUSTRIA: Radio Austria International. Station sign-on with identification and info to Spanish programming until 0005. German service to 0014, English to 0017, French to 0020, German to 0029. Transmitter shut off for one minute, resuming with ID at 0030 sign-on. Broadcast followed in Spanish to 0035, German to 0044, English to 0047, French to 0050, German to 0100 (Bob Fraser, Belfast, ME).

🔊 Streaming/on-demand audio <http://oe1.orf.at/service/international>

0012 UTC on 4935

BRAZIL: Rádio Capixiba Victoria (tentative). Announcer's Portuguese animated text—perhaps a live event. Studio announcement at 0021 with tentative ID in passing. Musical ballad at tune-out amid poor-fair signal (Scott Barbour, Intervale, NH). Additional Brazilians in Portuguese: **Rádio Senado** 5990, 0950 (Bruce Barker, Broomall, PA) **Rádio Nacional da Amazonia** 11780, 2346 (Stewart Mackenzie WDX6AA, Huntington Beach, CA). **Rádio Clube do Para** 4885, 0425-0431; 4885, 0510-0521; **Rádio Imaculada Conceição** 4755, 0455-0500; **Rádio Brazil Central** 4985, 0610 (Joe Wood, Greenback, TN). **Rádio Cancão Nova** 4825, 0425-0435; **Rádio Capixaba** 4935, 2243-2253; **Rádio Aparecida** 6135, 2302-2310; **Rádio Educação Rural** 4925.2, 2326-2333; **Rádio Difusora Macapa** 4915, 0443-0455 (Jim Evans, Germantown, TN). **Rádio Educação 6 de Agosto** 3255, 0950; **Rádio Alvorada** 4965, 0915+. 9; **Rádio Nove de Julho** 9819.47, 1330-1335 in Spanish with ID and time checks (Arnaldo Slaen, Buenos Aires, Argentina).

0032 UTC on 5952.40

BOLIVIA: Emisoras Pío XII. Announcer's Spanish phone conversation to Bolivian music amid fair signal with splatter. **Radio San Miguel** 4699.14, 0118-0130; **Radio Yura** 4716.65, 0124-0140+; **Radio San Gabriel** (tentative) 6080, 1118-1130 (Chuck Bolland, Clewiston, FL).

0247 UTC on 5009.9

MADAGASCAR: RTV Malagasy. Vocal pop music of drums and local stringed instruments. Very low audio for announcement of one minute, resuming to music. No ID at 0300 as music continued. Surprisingly good signal, peaking just before 0300. SINPO 33333 (Evans).

0255 UTC on 5979.93v

ETHIOPIA: Voice of Tigray Revolution. Sign-on with interval signal to talk and regional music. Weak signal, but readable. Frequency drifting, moved up to 5980.0 by 0301 // 5950 weak. **Radio Ethiopia** 9559.51v, *0659-0720. Sign-on interval signal // 7165. **Horn of Africa** style music at 0704. Weak signal, very poor in noisy conditions. Freq constantly drifts 9559.25- 9559.67 (Alexander).

0305 UTC on 3185

USA: WWRB. Nice program of swing music including *Chattanooga Choo-Choo* and *In the Mood* tunes. WWRB promo after 0330 for excellent signal quality. **Radio Marti** 5980, 1235-1240 in Spanish. **Voice of America** 7575, 1304-1357*; **American Forces Network** 7811 USB (Key West) 0511-0530; **WEWN** 11870, 0640 (Wood). **WWCR** 5070, 0145; 5890, 0935; **WTJC** 5920, 0958; **WHRI** 7385, 1011; **WRNO** 7505, 1025; **WYFR** 6085, 1045; 17555, 1728 (Tancoo). **VOA** 17895, 1905 (Mackenzie).

🔊 WWRB streaming audio www.wwrb.org
🔊 Radio Marti streaming audio <http://martinoticias.com/>
🔊 VOA streaming audio/on-demand www.voanews.com/english/portal.cfm
🔊 WEWN streaming audio www.ewtn.com/radio/index.asp
🔊 WWCR on-demand audio www.wwcr.com/
🔊 WTJC streaming audio www.fbnradio.com/

0344 UTC on 4800

MEXICO: XERTA-Radio Transcontinental de América. Mostly Spanish tunes covering religious, ballads and easy-listening instrumental music. Time checks and numerous identifications as "X-E-R-T-A" and mentions of Mexico. Good signal except for Guatemala's Buenas Nuevas (4799.73) to 0433.* Have never found either of these stations as loud (Ron Howard, Asilomar Beach, CA). 4800, 0415+ (Slaen). Mexico's **Radio Mil** 6010, 1044. Musical jingles, ID and reference to Mexico City (Robin Tancoo, Fyzabad, Trinidad).

0455 UTC on 7175

ERITREA: Voice of the Broad Masses of Eritrea (tentative). Faint signal of **Horn of Africa** style music to 0500. Lady announcer's Amharic text with interspersed musical bridges. Program mixed with chat and brief music segments after 0505. Signal very poor initially, improving to peak by 0507, declining during

amateur radio interference. Similar program format on subsequent rechecks (Evans).

0635 UTC on 9660

VATICAN STATE: Vatican Radio. Commentary on human rights abuses in Sub-Saharan Africa. **Panorama** program focus on current affairs in Africa. Bells of St. Peter at 0658 to 0659* (Barker). English 6040 // 7305, 0250-0300 (Rod Pearson, St. Augustine, FL).

🔊 Streaming/on-demand audio, video and podcast www.radiovaticana.org/inglese/enindex.html

1120 UTC on 2325

AUSTRALIA: VL8T-Tennant Creek. Pop music program to lady announcer. Signal poor-weak, // 2485 **VL8K-Katherine** weak (Barbour). VL8K, 2485, 0945 (Slaen). **Radio Australia** via Shepparton monitored freqs 11945, 1100 with ABC news; 9500, 1905 (Tancoo). 17795, 2238// 15230; 15560, 2255// 15240 // 17795 (Mackenzie). 6020, 1240 on Aussie global security (Wood). 12080 (Brandon). 2135-2140. **CVC International** (Darwin). 15170, 220-2235 (Evans).

🔊 Radio Australia streaming/on-demand audio www.radioaustralia.net

1124 UTC on 3976.1

INDONESIA: RRI-Pontianak (presumed). Indonesian programming from various announcers with talk and easy-listening to pop tunes. Signal in the clear until abrupt CW and amateur radio interference at 1130 (Barbour). Indo's monitored: **Voice of Indonesia** 9525.90, 1302-1330+ (Alexander). **VOI**, 9520, 1318-1325; 9525.88, 1504-1542 (Howard). **RRI-Pangkaraya** 3325, 1358-1438; 1523-1545; **RRI-Fak Fak** 4790.04, 1450-1455* (John Wilkins, Wheat Ridge, CO). **RRI-Jambi** 4925 (presumed) 1426-1526 (Howard). **RRI-Kendari** 3995.05, 1418-1436 (Wilkins).

1135 UTC on 3235

PAPUA NEW GUINEA: (New Britain) Radio West New Britain. Observed music at tune-in, followed by announcers comments. Signal threshold as back to music at 1147; 3235, 1209-1220 in Pidgin. **Radio East New Britain** 3385, 1144-1200; 3385, 1155-1215 in Pidgin (Evans; Bolland). (Admiralty Islands) **Radio Manus** 3315, 1208-1215 in Pidgin (New Guinea Territory) **Radio East New Sepik** 3335, 1203-1218 (Evans). **Radio Manus** 3315, 1331-1401* **Radio Bouganville** 3325, 1302-1312* (Howard).

1314 UTC on 5985.77v

MYANMAR: Myanmar Radio. Pop music to switching between different transmitters becoming the norm. Recheck at 1415 to find open carrier. Myanmar on 5770 had normal reception with pop music. Nothing heard on 9730.84v (Howard).

🔊 Streaming/on-demand audio at **Myanmar Today** <http://archive.wn.com/2005/09/04/1400/radiomyanmar/>

1758 UTC on 9330

SYRIA: Radio Damascus. Tune-in to local Middle Eastern music and brief announcement at 1800. Open carrier to 1806 German service; French service 1900-1942.* Strong carrier despite hum, good modulation initially though weaker by close. Surprised to hear // 12085 at 1850 check. Subsequent monitoring; 12085, 1855-1935* German/French. 9930, *2103-2201.*; 9930, 2055-2115+ English; 9930, 2211-2305* Spanish // 12085 (Alexander).

2224 UTC on 5850

SWEDEN: Radio Sweden. Swedish talk from announcer duo for moderate signal with less fading than usual at this time. SINPO 34333 (Evans). English noted 6010, 0240-0250; 6010, 0338-0358 (T.J. Banks, Dallas, TX).

🔊 Streaming/on-demand audio, podcast www.radiosweden.org

Additional loggings excluded for space constraints are posted as **Blog Logs** on the **Shortwave Central Blog** at the above web address.

*Thanks to our contributors – Have you sent in YOUR logs?
Send to Gayle Van Horn, c/o Monitoring Times
English broadcast unless otherwise noted.*

Fast Track to Amateur Radio

Amateur radio operators call it the *fast track news*, while others simply declare it *fantastic*. Call it what you will, but Richard Moseson W2VU, Editorial Director for *CQ Communications* has a hit on his hands. *World Radio Online* is the first wide-distribution general amateur radio interest magazine to be published exclusively online.

Topics covered include *Contest Calendar*, *Hamfest* and *Specials Events*, amateur news and more. Issues are available in a downloadable PDF file and may be accessed without charge at the CQ magazine home page www.cq-amateur-radio.com/. Go to the *WorldRadio Online* link.



Is Antarctica at the top of your amateur radio *Hit-List*? Operator Bob Paton VK0BP is currently working at Antarctica Davis Base Station until November 1, 2009. Activity is limited due to work commitments, but check around 1500-1800 UTC on 20 meters (14.0-14.350 MHz) on SSB and PSK31. Bob may also activate other field huts in the area and will sign-on as VK0BP/P. QSL route via Allan Meredith V2KCA, P.O. Box 890, Mudgee NSW 2850, Australia. For additional details from Bob consult his web page www.vk0bp.org/

Just logged a rare catch in the thrust of a major operators pile-up? Here's a great source for operators QSLing via QSL managers. The [QRZ.com](http://www.qrz.com) database contains manager references to over 68,000 DX call signs. The search page accepts partial

callsigns in case you didn't quite catch the complete ID. To learn more on QSL managers, consult www.qrz.com at the *QSL Managers* link. In addition to the database are *QSL Bureaus and Services*, *Tips for QSLers* and *QSL Card Designers and Printers*. Operator calls may also be searched by using the callsign search mode for addresses, QSL information and operator details.

The ARRL *Logbook of the World* (LoTW) system is a repository of log records submitted by operators around the world. When both contacts participate in a one-on-contact (QSO) and submit their records to LoTW, the result is a cardless verification used for ARRL credit. The League's QSL-cardless awards and contact credit system has grown to over 75 million, far exceeding the original predictions in 2003.

LoTW is open to all amateur radio operators, and applying for a digital certificate is the first step in taking advantage of the system. The digital certificate authenticates the user's identity. For information about *Log Book of the World* refer to: www.arrl.org/lotw/

VA3HJ Softwave (Speciality Software for the Radio Amateur) is offering *QSLDesignAndPrint* software version 1.0.0. The program designs and prints your QSL card, or can design a QSL card for a professional printer. Cards may contain one or more images, text fields for callsign, location and a greeting. Up to 5 QSOs may be printed on a card. For program information, including sample images of cards created using *QSLDesignsAndPrint* go to www.va3hj.ca

The Northern California DX Foundation, NCDXF, is now on Twitter. Twitter users can follow NCDXF by going to <http://twitter.com/NCDXF> and click on the *Follow* link. The foundation plans to keep DXers informed on activities, QSLing and related news. To find out more about Twitter consult <http://twitter.com/>. You'll find amateur radio operators and a bevy of radio-related hobbyist keeping you up to date on their radio pursuits.

DX stations, especially the rare portable DXpeditions, receive thousands of QSL cards. To ensure your out going QSL card package reaches its ultimate destination, here are a few tips to increase your return rate.

Although U.S. operators are usually not

considered "rare" DX, you must include a self-addressed-stamped envelope to help ensure a return QSL. Packaging your outgoing QSL (direct or to a QSL Manager) must include the following:

- * Correct date and time on the QSL. One of the most common reasons why dates and times are incorrect is a failure to use UTC time and date.
- * QSL card design. Callsigns should be on the same side of the QSL card as the contact information. This will assist the QSL Manager from having to constantly flip the card from back to front, thus eliminating the chance to get your callsign wrong.
- * Pull & seal security envelopes. By using the "press-and-seal" envelopes, your QSL Manager will thank you.
- * Wax-paper nesting. Include a piece of wax paper inside the nested envelope to prevent the envelope from "self-adhering" during transit to the DX station or Manager. Especially helpful when sending to tropical climate areas.
- * Return address on SASE. The QSL Manager's address should be placed on the top left corner of the envelope. No one wants a QSL in a "dead-letter" office.
- * Pre-stamped SASE. Your card will likely be sent out as soon as it is processed if you pre stamp the envelope, but be sure to affix the proper postage. If you do not pre-stamp, include enough compensation to cover the postal expense.
- * Direction of the SASE fold. In many cases you have to fold the SASE to fit within the outgoing envelope. When inserting the folded SASE, do so with the "fold" downwards. If the fold is at the top, the SASE may be sliced in half as it is opened.
- * No callsigns on envelope. Unfortunately in some countries, less than honest postal workers have discovered that envelopes labeled "ham radio contest" with call signs are prime targets for green stamps (US currency) within the envelope. If your mail will travel through potential trouble spots, avoid putting your callsign in the return corner. Instead, place your call on the inside, under the flap.
- * Avoid registered or certified mail. Either method is inconvenient to the QSL Manager, requiring a trip to the post office. This also delays your return wait on the verification. Use of either should be when it is the only way of guaranteeing it is handled properly through a country's postal system.
- * Enclosures in the envelope. Shortwave hobbyist and amateur radio operators know the significance of enclosing "goodies" within an envelope. Used postage stamps, souvenir postcards, newspaper clippings of interest, photos, business cards, stickers and decals will likely increase your return rate from the QSL Manager.





HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af
 ① ② ⑤ ③ ④ ⑥ ⑦

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Daylight Time) 4, 5, 6 or 7 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each hour.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC Sunday will be heard on Saturday evening in America (in other words, 8:30 pm Eastern, 7:30 pm Central, etc.).

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. English broadcasts are listed by UTC time on ①, then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not daily, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

Codes	
s/Sun	Sunday
m/Mon	Monday
t	Tuesday
w	Wednesday
h	Thursday
f	Friday
a/Sat	Saturday
occ:	occasional
DRM:	Digital Radio Mondiale
irreg	Irregular broadcasts
vl	Various languages
USB:	Upper Sideband

Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions. But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and MT readers to make the Shortwave Guide up-to-date as of one week before

print deadline.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas

af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
ca:	Central America
do:	domestic broadcast
eu:	Europe
me:	Middle East
na:	North America
pa:	Pacific
sa:	South America
va:	various

Mode used by all stations in this guide is AM unless otherwise indicated.

MT MONITORING TEAM

Gayle Van Horn
Frequency Manager

gaylevanhorn@monitoringtimes.com

Larry Van Horn, MT Asst. Editor
larryvanhorn@monitoringtimes.com

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

Rich D' Angelo/NASWA Flash Sheet, NASWA Journal; Arnie Coro/R Havana; Alokesh Gupta, New Delhi, India; Ivo Ivanov; Bulgaria; Carl Craig, Shelbyville, TN; Evelyn Marcy/WYFR; Frank Hillton, Charleston, SC; Daniel Sampson, Ernest Riley/PTSW; Harold Sellers, Canada/ODXA, DX Listening-In; Tom Taylor, UK; Stephen John Jones; Sam Wright, Biloxi, MS; Wolfgang Büeschel, Germany/WWDXC BC DX, Top News; AOKI; Ardic DX Club; Cumbre DX; DX Asia; British DX Club; EIBI; HFCC; Hard-Core DX; DX Mix News; World DX Club/Contact.

Shortwave Broadcast Bands

kHz	Meters
2300-2495	120 meters (Note 1)
3200-3400	90 meters (Note 1)
3900-3950	75 meters (Regional band, used for broadcasting in Asia only)
3950-4000	75 meters (Regional band, used for broadcasting in Asia and Europe)
4750-4995	60 meters (Note 1)
5005-5060	60 meters (Note 1)
5730-5900	49 meter NIB (Note 2)
5900-5950	49 meter WARC-92 band (Note 3)
5950-6200	49 meters
6200-6295	49 meter NIB (Note 2)
6890-6990	41 meter NIB (Note 2)
7100-7300	41 meters (Regional band, not allocated for broadcasting in the western hemisphere) (Note 4)
7300-7350	41 meter WARC-92 band (Note 3)
7350-7600	41 meter NIB (Note 2)
9250-9400	31 meter NIB (Note 2)
9400-9500	31 meter WARC-92 band (Note 3)
9500-9900	31 meters
11500-11600	25 meter NIB (Note 2)
11600-11650	25 meter WARC-92 band (Note 3)
11650-12050	25 meters
12050-12100	25 meter WARC-92 band (Note 3)
12100-12600	25 meter NIB (Note 2)
13570-13600	22 meter WARC-92 band (Note 3)
13600-13800	22 meters
13800-13870	22 meter WARC-92 band (Note 3)
15030-15100	19 meter NIB (Note 2)
15100-15600	19 meters
15600-15800	19 meter WARC-92 band (Note 3)
17480-17550	17 meter WARC-92 band (Note 3)
17550-17900	17 meters
18900-19020	15 meter WARC-92 band (Note 3)
21450-21850	13 meters
25670-26100	11 meters

Notes

- Note 1 Tropical bands, 120/90/60 meters are for broadcast use only in designated tropical areas of the world.
- Note 2 Broadcasters can use this frequency range on a (NIB) non-interference basis only.
- Note 3 WARC-92 bands are allocated officially for use by HF broadcasting stations in 2007.
- Note 4 WRC-03 update. After March 29, 2009, the spectrum from 7100-7200 kHz will no longer be available for broadcast purposes and will be turned over to amateur radio operations worldwide.

**GLENN HAUSER'S
WORLD OF RADIO**
<http://www.worldofradio.com>

For the latest DX and programming news, amateur nets, DX program schedules, audio archives and much more!

0000 UTC - 8PM EDT / 7PM CDT / 5PM PDT

0000	0000	UK, BBC World Service	5970as	6195as
		7105as 9410as	9740as	15335as
		15360as 17615as		
0000	0004	Canada, R Canada International		9755na
0000	0020	Japan, NHK World Radio Japan		5960eu
		6145na 13650as	17810as	
0000	0030	Australia, HCJB Global	15410as	15525as
0000	0030	Egypt, Radio Cairo 6850na		
0000	0030	Thailand, Radio Thailand World Svc		9680na
		12095na		
0000	0030	USA, Voice of America	7405as	
0000	0045	India, All India Radio	9705as	9950as
		11620as 11645as	13605as	
0000	0045	USA, WYFR/Family Radio Worldwide		17805na
0000	0057	Canada, R Canada International		9800as
0000	0057	China, China Radio International		6020na
		6075as 6180as	7130eu	7350eu
		9425as 9570as	11650as	11790as
		11885as		
0000	0100	Anguilla, Worldwide Univ Network		6090am
0000	0100	Australia, ABC NT Alice Springs		2310do
		4835do		
0000	0100	Australia, ABC NT Katherine	5025do	
0000	0100	Australia, ABC NT Tennant Creek		4910do
0000	0100	Australia, Radio Australia	9660as	12080as
		13690as 15240pa	17715as	17750va
		17775va 17795va		
0000	0100	Canada, CFRX Toronto ON	6070na	
0000	0100	Canada, CFVP Calgary AB	6030na	
0000	0100	Canada, CKZN St John's NF	6160na	
0000	0100	Canada, CKZU Vancouver BC	6160na	
0000	0100	Costa Rica, Worldwide Univ Network		7325va
		9725va		
0000	0100	Germany, Deutsche Welle	9885as	15595as
		17525as		
0000	0100	Guyana, Voice of Guyana	3291do	
0000	0100	Malaysia, RTM/Traxx FM	7295as	
0000	0100	DRM New Zealand, Radio NZ International		17675pa
0000	0100	New Zealand, Radio NZ International		15720pa
0000	0100	vi Papua New Guinea, Wantok R. Light		7325va
0000	0100	Romania, R Romania International		9580na
		11790na		
0000	0100	Spain, Radio Exterior Espana	6055na	
0000	0100	USA, American Forces Network		4319usb
		5446usb 5765usb	6350usb	7811usb
		10320usb 12132usb	13362usb	
0000	0100	USA, WBCQ Monticello ME	5110am	
0000	0100	mtfas USA, WBCQ Monticello ME	7415am	
0000	0100	USA, WBOH Newport NC	5920am	
0000	0100	USA, WEWN Vandiver AL	11520af	
0000	0100	USA, WHRA Greenbush ME	5850eu	
0000	0100	USA, WHRI Cypress Creek SC	5875na	7315sa
		7385na		
0000	0100	USA, WINB Red Lion PA	9265am	
0000	0100	USA, WRMI Miami FL	9955am	
0000	0100	USA, WTJC Newport NC	9370na	
0000	0100	USA, WWCR Nashville TN	5070na	7465na
		9980na		
0000	0100	USA, WWRB Manchester TN	3185va	5050na
		5745va 6890va		
0000	0100	USA, WYFR/Family Radio Worldwide		5950na
		6985na 9505sa	15440am	
0000	0100	Zambia CVC/ The Voice Africa	4965af	
0005	0100	twhfa Canada, R Canada International		9755am
0005	0100	Mon Greece, Voice of Greece	7475eu	9420eu
0030	0045	Sun Germany, Pan American BC	9640as	
0030	0100	Australia, Radio Australia	15415as	
0030	0100	China, China Radio International		11730as
0030	0100asf	UK, Bible Voice Broadcasting	9490as	
0030	0100	USA, Voice of America	7405va	9325va
		9620va 9715va	11695va	12005va
		15185va 15205va	15290va	
0030	0100	Uzbekistan, CVC International	7395as	

0100 UTC - 9PM EDT / 8PM CDT / 6PM PDT

0100	0104	twhfa Canada, R Canada International		9755am
0100	0125	Vietnam, Voice of Vietnam	6175na	
0100	0127	China, China Radio International		11730as
0100	0127	Czech Rep, Radio Prague	6200na	7345na
0100	0127	Slovakia, R Slovakia International		7230na
		9440sa		
0100	0128	mtwhfa Serbia, Intl Radio Serbia	6185na	6190al
0100	0130	Australia, Radio Australia	9660as	12080as
		13690as 15240pa	17715as	17750va

0100	0155	17775va 17795va		
0100	0157	DRM Turkey, Voice of Turkey	6165am	
0100	0157	China, China Radio International		6080na
		China, China Radio International		6005na
		6020na 6075as	7180as	7350 ey
		9410na 9570na	9580as	11650as
		11885as		
0100	0158	DRM New Zealand, Radio NZ International		17675pa
0100	0159	Canada, R Canada International		5840va
		6165as 7255as		
0100	0200	Anguilla, Worldwide Univ Network		6090am
0100	0200	Australia, ABC NT Katherine	5025do	
0100	0200	Australia, ABC NT Tennant Creek		4910do
0100	0200	Australia, HCJB Global	15410as	
0100	0200	Canada, CFRX Toronto ON	6070na	
0100	0200	Canada, CFVP Calgary AB	6030na	
0100	0200	Canada, CKZN St John's NF	6160na	
0100	0200	Canada, CKZU Vancouver BC	6160na	
0100	0200	Costa Rica, Worldwide Univ Network		7325va
		9725va		
0100	0200	Cuba, Radio Havana Cuba	6000na	6060na
		6140na		
0100	0200	Guyana, Voice of Guyana	3291do	
0100	0200	Malaysia, RTM/Traxx FM	7295as	
0100	0200	New Zealand, Radio NZ International		15720pa
0100	0200	North Korea, Voice of Korea	7140as	9345as
		9730as 11735am	13760am	15180am
0100	0200	Palau, T8WH/World Harvest	15680as	
0100	0200	vi Papua New Guinea, Wantok R. Light		7325va
0100	0200	Sri Lanka, SLBC	6005as	9770as
0100	0200	Taiwan, R Taiwan International	11875as	
0100	0200	UK, BBC World Service	5940va	5970as
		9410as 7105as	7140me	11750as
		11955as 15310as	15335as	15360as
		17615as		
0100	0200	Ukraine, R Ukraine International		7440na
0100	0200	USA, American Forces Network		4319usb
		5446usb 5765usb	6350usb	7811usb
		10320usb 12133usb	13362usb	
0100	0200	USA, Voice of America	7325va	9435va
		11705va		
0100	0200	USA, WBCQ Monticello ME	5110am	
0100	0200	USA, WBCQ Monticello ME	7415am	
0100	0200	USA, WBOH Newport NC	5920am	
0100	0200	USA, WEWN Vandiver AL	11520af	
0100	0200	USA, WHRA Greenbush ME	5850eu	
0100	0200	USA, WHRI Cypress Creek SC	5875na	7315sa
		7385na		
0100	0200	USA, WINB Red Lion PA	9265am	
0100	0200	USA, WRMI Miami FL	9955am	
0100	0200	USA, WTJC Newport NC	9370na	
0100	0200	USA, WWCR Nashville TN	5070na	7465na
		9980na		
0100	0200	USA, WWRB Manchester TN	3185va	5050na
		5745va 6890va		
0100	0200	USA, WYFR/Family Radio Worldwide		5950na
		6985na 9505na	15440am	
0100	0200	Uzbekistan, CVC International	7395as	
0100	0200	Zambia CVC/ The Voice Africa	4965af	
0130	0145	twhf Albania, Radio Tirana	7425na	
0130	0200	Australia, Radio Australia	9660as	12080as
		13690as 15240pa	15415as	17715as
		17750va 17795va		
0130	0200	Iran, VOIRI/ IRIB	9495na	7235na
0130	0200	Sweden, Radio Sweden	6010na	
0130	0200	twhfa USA, Voice of America	5960va	7405va

0200 UTC - 10PM EDT / 9PM CDT / 7PM PDT

0200	0204	twhfa Canada, R Canada International		9755na
0200	0227	Czech Rep, Radio Prague	6200na	7345na
0200	0228	Serbia, Intl Radio Serbia	6185na	6190al
0200	0230	Iran, VOIRI/ IRIB	9495na	7235na
0200	0230	Uzbekistan, CVC International	7395as	
0200	0245	USA, WYFR/Family Radio Worldwide		11835am
0200	0257	China, China Radio International		11770as
		13640as		
0200	0258	Sun Lithuania, Mighty KBC Radio	6110na	
0200	0300	Anguilla, Worldwide Univ Network		6090am
0200	0300	Argentina, Radio Nacional RAE	11710am	
0200	0300	Australia, ABC NT Alice Springs		2310do
		4835do		
0200	0300	Australia, ABC NT Katherine	5025do	
0200	0300	Australia, ABC NT Tennant Creek		4910do
0200	0300	Australia, HCJB Global	15410as	
0200	0300	Australia, Radio Australia	9660as	12080as
		13690as 15240pa	15415as	15515as
		17750va 21725va		

0200	0300	DRM	Bulgaria, Radio Bulgaria	9500na	
0200	0300		Bulgaria, Radio Bulgaria	9700na	11700na
0200	0300		Canada, CFRX Toronto ON	6070na	
0200	0300		Canada, CFVP Calgary AB	6030na	
0200	0300		Canada, CKZN St John's NF	6160na	
0200	0300		Canada, CKZU Vancouver BC	6160na	
0200	0300		Costa Rica, Worldwide Univ Network	7325va	
			9725va		
0200	0300		Cuba, Radio Havana Cuba	6000na	6060na
			6140na		
0200	0300		Egypt, Radio Cairo 7535na		
0200	0300		Guyana, Voice of Guyana	3291do	
0200	0300		Indonesia, Voice of Indonesia	9526va	11784al
0200	0300		Malaysia, RTM/Traxx FM	7295as	
0200	0300	DRM	New Zealand, Radio NZ International	17675pa	
0200	0300		New Zealand, Radio NZ International	15720pa	
0200	0300		North Korea, Voice of Korea	13650as	15100as
0200	0300		Palau, T8WH/World Harvest	15680as	
0200	0300	vl	Papua New Guinea, Wantok R. Light	7325va	
0200	0300		Philippines, Radyo Pilipinas	11880va	15285va
			17710va		
0200	0300		Russia, Voice of Russia	6100na	6240na
			7250na	7355na	12040na
0200	0300		South Korea, KBS World Radio	9580sa	
0200	0300		Sri Lanka, SLBC	6005as	9770as
0200	0300		Taiwan, R Taiwan International	5950na	
0200	0300		Thailand, Radio Thailand World Svc		15275na
0200	0300		UK, BBC World Service	6005af	6195me
			15310as		
0200	0300		USA, American Forces Network		4319usb
			5446usb	5765usb	6350usb
			10320usb	12133usb	13362usb
0200	0300		USA, KJES Vado NM	7555na	
0200	0300		USA, KJES Vado NM	7555na	
0200	0300	smt	USA, WBCQ Monticello ME	7415am	
0200	0300	m	USA, WBCQ Monticello ME	5110am	
0200	0300		USA, WBOH Newport NC	5920am	
0200	0300		USA, WEWN Vandiver AL	11520af	
0200	0300		USA, WHRA Greenbush ME	5850eu	
0200	0300		USA, WHRI Cypress Creek SC	5875na	7315sa
			7490na		
0200	0300		USA, WINB Red Lion PA	9265am	
0200	0300		USA, WRMI Miami FL	9955am	
0200	0300		USA, WTJC Newport NC	9370na	
0200	0300		USA, WWCR Nashville TN	3215na	5070na
			5890na		
0200	0300		USA, WWRB Manchester TN	3185va	5050na
			5745va	6890va	
0200	0300		USA, WYFR/Family Radio Worldwide		5985sa
			6985na	9505na	9680am
0215	0230		Nepal, Radio Nepal	5005as	
0230	0255		Vietnam, Voice of Vietnam	6175ca	
0230	0257		China, China Radio International		15435me
0230	0300		Malaysia, RTM/Voice of Malaysia	15295pa	
0230	0300		South Korea, KBS World Radio	9560na	
0230	0300		Sweden, Radio Sweden	6010na	11550va
0230	0300		Uzbekistan, CVC International	11650as	
0245	0300	twfhas	Albania, Radio Tirana	7390na	
0245	0300		Myanmar, Myanma Radio	9731do	
0250	0300		Vatican City, Vatican Radio	6040am	7305na
0255	0300	vl	Rwanda, Radio Rwanda	6055do	

0300 UTC - 11PM EDT / 10PM CDT / 8PM PDT

0300	0320		Vatican City, Vatican Radio	6040am	7305na
0300	0330		Egypt, Radio Cairo 7535na		
0300	0330		Myanmar, Myanma Radio	9731do	
0300	0330		Philippines, Radyo Pilipinas	11880va	15285va
			17710va		
0300	0330		Sri Lanka, SLBC	6005as	9770as
0300	0330		USA, KJES Vado NM	7555na	
0300	0330		Vatican City, Vatican Radio	7360af	9660af
0300	0357		China, China Radio International	6190na	
			9460as	9690na	11770as
			15110as	15120as	13620as
0300	0400		Anguilla, Worldwide Univ Network		6090am
0300	0400		Australia, ABC NT Alice Springs		2310do
			4835do		
0300	0400		Australia, ABC NT Katherine	5025do	
0300	0400		Australia, ABC NT Tennant Creek		4910do
0300	0400		Australia, Radio Australia	9660as	12080as
			13690as	15240pa	15415as
			17750va	21725va	15515as
0300	0400	twfhas	Canada, CBC NQ SW Service	9625na	
0300	0400		Canada, CFRX Toronto ON	6070na	
0300	0400		Canada, CFVP Calgary AB	6030na	
0300	0400		Canada, CKZN St John's NF	6160na	
0300	0400		Canada, CKZU Vancouver BC	6160na	

0300	0400		Costa Rica, Worldwide Univ Network		7325va
			9725va		
0300	0400		Cuba, Radio Havana Cuba	6000na	6060na
			6140na		
0300	0400		Germany, Deutsche Welle	11975as	15595as
0300	0400		Guyana, Voice of Guyana	3291do	
0300	0400		Malaysia, RTM/Traxx FM	7295as	
0300	0400		Malaysia, RTM/Voice of Malaysia		6175as
			9750as	15295as	
0300	0400		New Zealand, Radio NZ International		15720pa
0300	0400	DRM	New Zealand, Radio NZ International		17675pa
0300	0400		North Korea, Voice of Korea	7140as	9345as
			9730as		
0300	0400		Oman, Radio Oman	15355as	
0300	0400		Palau, T8WH/World Harvest	15680as	
0300	0400	vl	Papua New Guinea, Wantok R. Light		7325va
0300	0400		Romania, R Romania International		6150na
			9645na	9735as	11895as
0300	0400		Russia, Voice of Russia	6100na	6155na
			6240na	7340na	7350na
			12040na	13735na	7335na
0300	0400	vl	Rwanda, Radio Rwanda		6055do
0300	0400		South Africa, Channel Africa		3345af
0300	0400		Sweden, Radio Sweden		6010na
0300	0400		Taiwan, R Taiwan International	5950na	15215sa
			15320as		
0300	0400		UK, BBC World Service	3255af	6005af
			6145af	6190af	6195me
			7255af	7375af	9410me
			11760va	15310as	17790as
0300	0400		USA, American Forces Network		4319usb
			5446usb	5765usb	6350usb
			10320usb	12133usb	13362usb
0300	0400		USA, Voice of America	4930af	6080af
			9885af	15580af	
0300	0400		USA, WBCQ Monticello ME	7415am	
0300	0400	m	USA, WBCQ Monticello ME	5110am	
0300	0400		USA, WBCQ Monticello ME	9330am	
0300	0400		USA, WBOH Newport NC	5920am	
0300	0400		USA, WEWN Vandiver AL	9455af	
0300	0400		USA, WHRA Greenbush ME	5850eu	
0300	0400		USA, WHRI Cypress Creek SC	5875na	7315sa
			7385va		
0300	0400		USA, WRMI Miami FL	9955am	
0300	0400		USA, WTJC Newport NC	9370na	
0300	0400		USA, WWCR Nashville TN	3215na	5070na
			5890na		
0300	0400		USA, WWRB Manchester TN	3185va	5050na
			5745va	6890va	
0300	0400		USA, WYFR/Family Radio Worldwide		11740na
			15255am		
0300	0400		Uzbekistan, CVC International	11650as	
0300	0400		Zambia CVC/ The Voice Africa	4965af	
0330	0355		Vietnam, Voice of Vietnam	6175na	
0330	0400	twfhas	Albania, Radio Tirana	6110na	
0330	0400		UK, BBC World Service	11945af	

0400 UTC - 12AM EDT / 11PM CDT / 9PM PDT

0400	0427		Czech Rep, Radio Prague	6080na	6200na
			7345na		
0400	0430		Australia, Radio Australia	9660as	12080as
			13690as	15240pa	15515as
			21725va		17750va
0400	0430	mtwhf	France, Radio France International		7315af
			9805af		
0400	0430		Netherlands, R Netherlands Worldwide		9885af
			12080af		
0400	0430		Uzbekistan, CVC International	11650as	
0400	0445		USA, WYFR/Family Radio Worldwide		6985na
			9505na		
0400	0455		Turkey, Voice of Turkey	6020am	7240va
			7325na		
0400	0457		China, China Radio International		6190na
			9590as	13650as	15120as
0400	0458		New Zealand, Radio NZ International		15720pa
0400	0458	DRM	New Zealand, Radio NZ International		17675pa
0400	0500		Anguilla, Worldwide Univ Network		6090am
0400	0500		Australia, ABC NT Alice Springs		2310do
			4835do		
0400	0500		Australia, ABC NT Katherine	5025do	
0400	0500		Australia, ABC NT Tennant Creek		4910do
0400	0500	twfhas	Canada, CBC NQ SW Service	9625na	
0400	0500		Canada, CFRX Toronto ON	6070na	
0400	0500		Canada, CKZN St John's NF	6160na	
0400	0500		Canada, CKZU Vancouver BC	6160na	
0400	0500		Costa Rica, Worldwide Univ Network		7325va
			9725va		

0400	0500		Cuba, Radio Havana Cuba	6000na	6060na
			6140na		
0400	0500		Germany, Deutsche Welle	7245af	7430af
			12045af 15445af		
0400	0500	DRM	Germany, Deutsche Welle	3995af	
0400	0500		Guyana, Voice of Guyana	3291do	
0400	0500		Malaysia, RTM/Traxx FM	7295as	
0400	0500		Malaysia, RTM/Voice of Malaysia	6175as	
			9750as 15295as		
0400	0500		Palau, T8WH/World Harvest	15680as	
0400	0500	vl	Papua New Guinea, Wantok R. Light	7325va	
0400	0500		Russia, Voice of Russia	6135na	6155na
			6240na 7335na 7250na		9840na
			9855na 12030na		
0400	0500	DRM	Russia, Voice of Russia	15735as	
0400	0500	vl	Rwanda, Radio Rwanda	6055do	
0400	0500		South Africa, Channel Africa	7230af	
0400	0500	vl	Uganda, UBC Radio	4976do	5026do
0400	0500		UK, BBC World Service	3255af	5875eu
			6005af 6190af 7255af		9410me
			9650af 11945af 12035af		15310as
			15360me 17790as		
0400	0500		Ukraine, R Ukraine International	7440eu	
0400	0500		USA, American Forces Network	4319usb	
			5446usb 5765usb 6350usb		7811usb
			10320usb 12133usb		13362usb
0400	0500		USA, Voice of America	4930af	4960af
			6080af 9885af 15580af		
0400	0500	stwhfa	USA, WBCQ Monticello ME	7415am	
0400	0500		USA, WBCQ Monticello ME	9330am	
0400	0500		USA, WBOH Newport NC	5920am	
0400	0500		USA, WEWN Vandiver AL	9455af	
0400	0500		USA, WHRA Greenbush ME	5850eu	
0400	0500		USA, WHRI Cypress Creek SC	5875na	7315sa
			7385va		
0400	0500		USA, WRMI Miami FL	9955am	
0400	0500		USA, WTJC Newport NC	9370na	
0400	0500		USA, WWCR Nashville TN	3215na	5070na
			5890na		
0400	0500		USA, WWRB Manchester TN	3185va	5050na
			5745va 6890va		
0400	0500		USA, WYFR/Family Radio Worldwide	5950na	
			6915na 9680na		
0400	0500		Zambia CVC/ The Voice Africa	4965af	7160af
0430	0457		Czech Rep, Radio Prague	9855af	
0430	0500	twfhas	Albania, Radio Tirana	6100na	
0430	0500		Australia, Radio Australia	9660as	12080as
			13690as 15240pa 15415as		15515as
			17750va 21725va		
0430	0500	mtwh	Italy, NEXUS/IRRS	5990va	
0430	0500		Netherlands, R Netherlands Worldwide	12080af	
0430	0500		Nigeria, Radio Nigeria/Kaduna	6090do	
0430	0500	mtwhf	Swaziland, TWR	3200af	
0430	0500		Uzbekistan, CVC International	155610as	
0459	0500		New Zealand, Radio NZ International	11725pa	
0459	0500	DRM	New Zealand, Radio NZ International	11675pa	

0500 UTC - 1AM EDT / 12AM CDT / 10PM PDT

0500	0507	twfhas	Canada, CBC NQ SW Service	9625na	
0500	0530		Australia, Radio Australia	9660as	12080as
			13690as 15160as 15240pa		15515as
			17750va		
0500	0530	mtwhf	France, Radio France International	9805af	
			11995af 13680af		
0500	0530		Germany, Deutsche Welle	9440af	9440af
			9700af 9825af		
0500	0530	mtwh	Italy, NEXUS/IRRS	5990va	
0500	0530		Japan, NHK World Radio Japan	5975eu	
			6110na 11970af 15325as		17810as
0500	0530	twhfa	USA, WBCQ Monticello ME	7415am	
0500	0530		Vatican City, Vatican Radio	7360af	9660af
			11625af		
0500	0557		China, China Radio International	5960na	
			6190na 7220na 11880as		15350as
			15465va 17505as 17540as		17725as
			17855as		
0500	0600		Anguilla, Worldwide Univ Network	6090am	
0500	0600		Australia, ABC NT Alice Springs	2310do	
			4835do		
0500	0600		Australia, ABC NT Katherine	5025do	
0500	0600		Australia, ABC NT Tennant Creek	4910do	
0500	0600		Bhutan, Bhutan Broadcasting Svc	6035as	
0500	0600		Canada, CFRX Toronto ON	6070na	
0500	0600		Canada, CKZN St John's NF	6160na	
0500	0600		Canada, CKZU Vancouver BC	6160na	
0500	0600		Costa Rica, Worldwide Univ Network	7325va	
			9725va		

0500	0600		Cuba, Radio Havana Cuba	6000na	6060na
			6140na		
0500	0600	DRM	Germany, Deutsche Welle	17525as	
0500	0600		Guyana, Voice of Guyana	3291do	
0500	0600		Kuwait, Radio Kuwait	15110va	
0500	0600		Malaysia, RTM/Traxx FM	7295as	
0500	0600		Malaysia, RTM/Voice of Malaysia	6175as	
			9750as 15295as		
0500	0600		New Zealand, Radio NZ International	11725pa	
0500	0600	DRM	New Zealand, Radio NZ International	11675pa	
0500	0600		Nigeria, Radio Nigeria/Kaduna	4770do	
0500	0600		Palau, T8WH/World Harvest	15680as	
0500	0600	vl	Papua New Guinea, Wantok R. Light	7325va	
0500	0600		Russia, Voice of Russia	6135na	7335na
			7350na 9840na		9855na 12030na
0500	0600	DRM	Russia, Voice of Russia	15735as	
0500	0600		South Africa, Channel Africa	7230af	9745af
0500	0600		Swaziland, TWR	3200af	
0500	0600		Swaziland, TWR	3200af	
0500	0600	vl	Uganda, UBC Radio	4976do	5026do
0500	0600		UK, BBC World Service	3255af	6005af
			6190af 7255af 9410me		11765af
			11945af 12095eu 15310as		15360me
			15420af 17640af		
0500	0600	DRM	UK, BBC World Service	3995af	
0500	0600		USA, American Forces Network	4319usb	
			5446usb 5765usb 6350usb		7811usb
			10320usb 12133usb		13362usb
0500	0600		USA, Voice of America	4930af	6080af
			9885af 15580af		
0500	0600		USA, WBOH Newport NC	5920am	
0500	0600		USA, WEWN Vandiver AL	9455af	
0500	0600		USA, WHRA Greenbush ME	7465va	
0500	0600	mtwhf	USA, WHRI Cypress Creek SC	7315sa	
0500	0600	Sat/Sun	USA, WHRI Cypress Creek SC	11565pa	
0500	0600		USA, WHRI Cypress Creek SC	5875na	7385va
0500	0600		USA, WRMI Miami FL	9955am	
0500	0600		USA, WTJC Newport NC	9370na	
0500	0600		USA, WWCR Nashville TN	3215na	5070na
			5890na		
0500	0600		USA, WWRB Manchester TN	3185va	
0500	0600		USA, WYFR/Family Radio Worldwide	5950na	
			6915na 9680na		
0500	0600		Uzbekistan, CVC International	15610as	
0500	0600		Zambia CVC/ The Voice Africa	4965af	7160af
0515	0530	vl	Rwanda, Radio Rwanda	6055do	
0530	0600		Australia, Radio Australia	9660as	12080as
			13690as 15160as 15240pa		15415as
			15515as 17750va		
0530	0600		China, Central People's BS/CNR	9530do	
			11685do 15570do		
0530	0600		Romania, R Romania International	7305eu	
			9655eu 15435pa 17770pa		
0530	0600	vl	Rwanda, Radio Rwanda	6055do	
0530	0600		Thailand, Radio Thailand World Svc	11730va	

0600 UTC - 2AM EDT / 1AM CDT / 11PM PDT

0600	0615	Sat/Sun	South Africa, Trans World Radio	11640af	
0600	0630	Sat/Sun	Australia, Radio Australia	15180as	15290as
0600	0630		Australia, Radio Australia	9660as	11650as
			12080as 13690as 15160as		15240pa
			15515as 17750va		
0600	0630	mtwhf	France, Radio France International	9765af	
			15160af		
0600	0630		Germany, Deutsche Welle	7310af	15275af
0600	0630		Nigeria, Radio, National Svc/Abuja	7275do	
0600	0630		Vatican City, Vatican Radio	4005eu	5965eu
			7250eu		
0600	0645	mtwhf	South Africa, Trans World Radio	11640af	
0600	0657		China, China Radio International	16115na	
			11750af 11880as 13645as		15145me
			15350as 15465as 17505va		17540as
			17710as 17770me		
0600	0658		New Zealand, Radio NZ International	11725pa	
0600	0658	DRM	New Zealand, Radio NZ International	11675pa	
0600	0700		Anguilla, Worldwide Univ Network	6090am	
0600	0700		Australia, ABC NT Alice Springs	2310do	
			4835do		
0600	0700		Australia, ABC NT Katherine	5025do	
0600	0700		Australia, ABC NT Tennant Creek	4910do	
0600	0700		Canada, CFRX Toronto ON	6070na	
0600	0700		Canada, CFVP Calgary AB	6030na	
0600	0700		Canada, CKZN St John's NF	6160na	
0600	0700		Canada, CKZU Vancouver BC	6160na	
0600	0700		Costa Rica, Worldwide Univ Network	7325va	
			9725va		
0600	0700		Cuba, Radio Havana Cuba	6000na	6060na

0600	0700		6140na		
0600	0700	DRM	Germany, Deutsche Welle	3995eu	6130eu
0600	0700		Germany, Deutsche Welle	3995eu	6130eu
0600	0700		Guyana, Voice of Guyana	3291do	
0600	0700		Kuwait, Radio Kuwait	15110va	
0600	0700		Malaysia, RTM/Traxx FM	7295as	
0600	0700		Malaysia, RTM/Voice of Malaysia		6175as
			9750as	15295as	
0600	0700		Nigeria, Radio Nigeria/Kaduna	4770do	
0600	0700	vl	Papua New Guinea, Wantok R. Light		7325va
0600	0700		Russia, Voice of Russia	17665pa	17805pa
0600	0700		South Africa, Channel Africa	7230af	15255af
0600	0700		UK, BBC World Service	6005af	6190af
			7255af	9410af	9860af
			11765af	15310as	15420af
			17790as		
0600	0700	DRM/ vl	UK, BBC World Service	3995af	
0600	0700		Ukraine, R Ukraine International		7440eu
0600	0700		USA, American Forces Network		4319usb
			5446usb	5765usb	6350usb
			10320usb	12133usb	13362usb
0600	0700		USA, Voice of America	6080af	9885af
			15580af		
0600	0700		USA, WBOH Newport NC	5920am	
0600	0700		USA, WEWN Vandiver AL	9455af	
0600	0700		USA, WHRA Greenbush ME	7465va	
0600	0700	mtwhf	USA, WHRI Cypress Creek SC	7315sa	
0600	0700	Sat/Sun	USA, WHRI Cypress Creek SC	11565pa	
0600	0700		USA, WHRI Cypress Creek SC	7385va	
0600	0700		USA, WRMI Miami FL	9955am	
0600	0700		USA, WTJC Newport NC	9370na	
0600	0700		USA, WWCR Nashville TN	3215na	5070na
			5890na		
0600	0700		USA, WWRB Manchester TN	3185va	
0600	0700		USA, WYFR/Family Radio Worldwide		5850eu
			7520sa	9680na	11530va
0600	0700		Uzbekistan, CVC International	15610as	
0600	0700	vl	Vanuatu, Radio Vanatu	7260do	
0600	0700		Zambia CVC/ The Voice Africa	6065af	13590af
0630	0700		Australia, Radio Australia	9660as	11650as
			12080as	13690as	15160as
			15415as	15515as	17750va
0630	0700		Bulgaria, Radio Bulgaria	9600eu	11600eu
0630	0700		Vatican City, Vatican Radio	7360af	9660af
			11625af		
0659	0700		New Zealand, Radio NZ International		9765pa
0659	0700	DRM	New Zealand, Radio NZ International		9870pa

0700 UTC - 3AM EDT / 2AM CDT / 12AM PDT

0700	0703		Croatia, Voice of Croatia	15360eu	17655eu
0700	0703	vl	Croatia, Voice of Croatia	6165eu	9470pa
			11690pa		
0700	0706		UK, BBC World Service	6005af	
0700	0727		Slovakia, R Slovakia International		13715va
			15460va		
0700	0730		France, Radio France International		15605af
0700	0730	mtwhf	UK, BBC World Service	15575as	
0700	0730	Sun	UK, Bible Voice Broadcasting	5945eu	
0700	0745		USA, WYFR/Family Radio Worldwide		7520eu
0700	0757		China, China Radio International	11785eu	
			11880as	15125as	15350as
			17540as		17490eu
0700	0800		Anguilla, Worldwide Univ Network		6090am
0700	0800		Australia, ABC NT Alice Springs		2310do
			4835do		
0700	0800		Australia, ABC NT Katherine	5025do	
0700	0800		Australia, ABC NT Tennant Creek		4910do
0700	0800		Australia, Radio Australia	9475as	9660as
			9710as	11650as	11945as
			13630pa	15160va	15240pa
					17750va
0700	0800		Bhutan, Bhutan Broadcasting Svc		6035as
0700	0800		Canada, CFRX Toronto ON	6070na	
0700	0800		Canada, CFVP Calgary AB	6030na	
0700	0800		Canada, CKZN St John's NF	6160na	
0700	0800		Canada, CKZU Vancouver BC	6160na	
0700	0800		Costa Rica, Worldwide Univ Network		7325va
			9725va		
0700	0800	DRM	Germany, Deutsche Welle	5790eu	9545eu
0700	0800		Guyana, Voice of Guyana	3291do	
0700	0800		Kuwait, Radio Kuwait	15110va	
0700	0800	Sat	Latvia, Radio SWH	9290eu	
0700	0800		Malaysia, RTM/Traxx FM	7295as	
0700	0800		Malaysia, RTM/Voice of Malaysia		6175as
			9750as	15295as	
0700	0800		Myanmar, Myanma Radio	9731do	
0700	0800		New Zealand, Radio NZ International		9765pa
0700	0800	DRM	New Zealand, Radio NZ International		9870pa

0700	0800		Nigeria, Radio Nigeria/Kaduna	4770do	
0700	0800		Palau, T8WH/World Harvest	9930as	15680as
0700	0800	vl	Papua New Guinea, R East New Britain		3385do
0700	0800	vl	Papua New Guinea, Wantok R. Light		7325va
0700	0800	DRM	Russia, Voice of Russia	11635eu	
0700	0800		Russia, Voice of Russia	17665pa	17805pa
0700	0800	vl	Solomon Islands, SIBC	5020do	
0700	0800	vl	South Africa, Channel Africa	9625af	
0700	0800		UK, BBC World Service	6190af	9860af
			11760me	11765af	15310as
			15420af	17790as	17830af
0700	0800	DRM/ vl	UK, BBC World Service	3995eu	
0700	0800		USA, American Forces Network		4319usb
			5446usb	5765usb	6350usb
			10320usb	12133usb	13362usb
0700	0800		USA, WBOH Newport NC	5920am	
0700	0800		USA, WEWN Vandiver AL	9455af	
0700	0800	mtwhf	USA, WHRI Cypress Creek SC	7315sa	11565va
0700	0800	Sat/Sun	USA, WHRI Cypress Creek SC	5875va	11565va
0700	0800		USA, WHRI Cypress Creek SC	7385na	
0700	0800		USA, WRMI Miami FL	9955am	
0700	0800		USA, WTJC Newport NC	9370na	
0700	0800		USA, WWCR Nashville TN	3215na	5070na
			5890na		
0700	0800		USA, WWRB Manchester TN	3185va	
0700	0800		USA, WYFR/Family Radio Worldwide		5950na
			5985na	6915na	9340am
0700	0800		Uzbekistan, CVC International	15610as	
0700	0800	vl	Vanuatu, Radio Vanatu	7260do	
0700	0800		Zambia CVC/ The Voice Africa	6065af	13590af
0730	0745		Vatican City, Vatican Radio	4005eu	5965eu
			7250eu	9645eu	11740eu
0730	0800		Australia, HCJB Global		11750pa
0730	0800	Sat/Sun	UK, BBC World Service	15575as	
0730	0800	Sat	UK, Bible Voice Broadcasting	5945eu	
0745	0800	Sun	Germany, TWR-Europe	6105eu	
0745	0800	Sun	Monaco, TWR-Europe	9800eu	
0745	0800	f	UK, Bible Voice Broadcasting	5945eu	
0750	0800		Saudi Arabia, BSKSA	17785as	

0800 UTC - 4AM EDT / 3AM CDT / 1AM PDT

0800	0815	Sat	UK, Bible Voice Broadcasting	5945eu	
0800	0825		Malaysia, RTM/Voice of Malaysia		6175as
			9750as	15295as	
0800	0827		Czech Rep, Radio Prague	7345eu	9860eu
0800	0830		Australia, ABC NT Katherine	5025do	
0800	0830		Australia, ABC NT Tennant Creek		4910do
0800	0830		Myanmar, Myanma Radio	9731do	
0800	0845		USA, WYFR/Family Radio Worldwide		5950na
			9340af		
0800	0850	mtwhf	Germany, TWR-Europe	6105eu	
0800	0850	mtwhf	Monaco, TWR-Europe	9800eu	
0800	0857		China, China Radio International		9415as
			11785eu	11880as	15350as
			15625va	17490eu	17540as
0800	0900		Anguilla, Worldwide Univ Network		6090am
0800	0900		Australia, ABC NT Alice Springs		2310do
			4835do		
0800	0900		Australia, HCJB Global		11750pa
0800	0900		Australia, Radio Australia	5995as	9475as
			9580va	9590as	9710as
			12080as	13630pa	
0800	0900		Bhutan, Bhutan Broadcasting Svc		6035as
0800	0900		Canada, CFRX Toronto ON	6070na	
0800	0900		Canada, CFVP Calgary AB	6030na	
0800	0900		Canada, CKZN St John's NF	6160na	
0800	0900		Canada, CKZU Vancouver BC	6160na	
0800	0900		Costa Rica, Worldwide Univ Network		7325va
			9725va		
0800	0900	DRM	Germany, Deutsche Welle	9545eu	12095as
			13810eu		
0800	0900	Sun	Germany, TWR-Europe	6105eu	
0800	0900		Guyana, Voice of Guyana	3291do	
0800	0900	Sat	Italy, NEXUS/IRRS	9510va	
0800	0900		Malaysia, RTM/Traxx FM	7295as	
0800	0900	Sun	Monaco, TWR-Europe	9800eu	
0800	0900		New Zealand, Radio NZ International		9765pa
0800	0900	DRM	New Zealand, Radio NZ International		9870pa
0800	0900		Nigeria, Radio Nigeria/Kaduna	4770do	
0800	0900		Nigeria, Voice of Nigeria/Lagos		9690af
0800	0900		Palau, T8WH/World Harvest	9930as	15680as
0800	0900	vl	Papua New Guinea, R East New Britain		3385do
0800	0900	vl	Papua New Guinea, Wantok R. Light		7325va
0800	0900		Russia, Voice of Russia	15195as	17665pa
			17805pa		
0800	0900	vl	Solomon Islands, SIBC	5020do	
0800	0900	vl	South Africa, Channel Africa	9625af	

0800	0900	Sun	South Africa, SA Radio League	7205af	17860af
0800	0900		South Korea, KBS World Radio		9570as
0800	0900		UK, BBC World Service	6190af	9860af
			11760me	15310as	15400af
			17790af	17830af	21470af
0800	0900	Sat/Sun	UK, BBC World Service	15575me	
0800	0900		USA, American Forces Network		4319usb
			5446usb	5765usb	6350usb
			10320usb	12133usb	13362usb
0800	0900		USA, KNLS Anchor Point AK	9615as	
0800	0900		USA, WBOH Newport NC	5920am	
0800	0900		USA, WEWN Vandiver AL	9455af	
0800	0900	mtwhf	USA, WHRI Cypress Creek SC	7315sa	11565va
0800	0900	Sat/Sun	USA, WHRI Cypress Creek SC	5875va	11565pa
0800	0900		USA, WHRI Cypress Creek SC	7385na	
0800	0900		USA, WRMI Miami FL	9955am	
0800	0900		USA, WTJC Newport NC	9370na	
0800	0900		USA, WWCR Nashville TN	3215na	5070na
			5890na		
0800	0900		USA, WWRB Manchester TN	3185va	
0800	0900		USA, WYFR/Family Radio Worldwide		5985am
			6915na		
0800	0900		Uzbekistan, CVC International	15610as	
0800	0900	vl	Vanuatu, Radio Vanatu	7260do	
0800	0900		Zambia CVC/ The Voice Africa	6065af	13590af
0805	0900	thf	Guam, KTWR/TWR	15190as	
0815	0850	Sat	Germany, TWR-Europe	6105eu	
0815	0850	Sat	Monaco, TWR-Europe	9800eu	
0820	0900	w	Guam, KTWR/TWR	15170as	
0830	0900		Australia, ABC NT Katherine	2485do	
0830	0900		Australia, ABC NT Tennant Creek		2325do
0830	0900		Australia, CVC International	15555as	
0835	0900	m	Guam, KTWR/TWR	15170as	
0855	0900	mtwhf	Guam, KTWR/TWR	11840pa	

0900 UTC - 5AM EDT / 4AM CDT / 2AM PDT

0900	0920	Sun	Germany, TWR-Europe	6105eu	
0900	0920	Sun	Monaco, TWR-Europe	9800eu	
0900	0930		Australia, HCJB Global	11750pa	
0900	0930	mtwhf	Guam, KTWR/TWR	11840pa	
0900	0930		Japan, NHK World Radio Japan		9625pa
			9825pa	11815as	15590as
0900	0930		Uzbekistan, CVC International	15610as	
0900	0957		China, China Radio International		9415as
			15210pa	15270eu	15350as
			17570eu	17690pa	17750as
0900	1000		Anguilla, Worldwide Univ Network		6090am
0900	1000		Australia, ABC NT Alice Springs		2310do
			4835do		
0900	1000		Australia, ABC NT Katherine	2485do	
0900	1000		Australia, ABC NT Tennant Creek		2325do
0900	1000		Australia, CVC International	15555as	
0900	1000		Australia, Radio Australia	9475va	9580va
			9590va	11945as	12080as
0900	1000		Bhutan, Bhutan Broadcasting Svc		6035as
0900	1000		Canada, CFRX Toronto ON	6070na	
0900	1000		Canada, CFVP Calgary AB	6030na	
0900	1000		Canada, CKZN St John's NF	6160na	
0900	1000		Canada, CKZU Vancouver BC	6160na	
0900	1000		Costa Rica, Worldwide Univ Network		7325va
			9725va		
0900	1000		Germany, Deutsche Welle	15340as	17705as
0900	1000	DRM	Germany, Deutsche Welle	9545eu	13810eu
0900	1000		Guyana, Voice of Guyana	3291do	
0900	1000		Malaysia, RTM/Traxx FM	7295as	
0900	1000		New Zealand, Radio NZ International		9765pa
0900	1000	DRM	New Zealand, Radio NZ International		9870pa
0900	1000		Nigeria, Radio Nigeria/Kaduna	4770do	
0900	1000		Nigeria, Voice of Nigeria/Lagos		9690af
0900	1000		Palau, T8WH/World Harvest	9930as	15680as
0900	1000	vl	Papua New Guinea, R East New Britain		3385do
0900	1000	vl	Papua New Guinea, Wantok R. Light		7325va
0900	1000		Russia, Voice of Russia	15195as	17665pa
0900	1000	DRM	Russia, Voice of Russia	13670eu	
0900	1000		Saudi Arabia, BSKSA	15250af	
0900	1000	vl	Solomon Islands, SIBC	5020do	
0900	1000	vl	South Africa, Channel Africa	9625af	
0900	1000		UK, BBC World Service	6190af	6195as
			9740as	9860af	11760me
			15400af	15575me	17640af
			17790as	17830af	21470af
0900	1000		USA, American Forces Network		4319usb
			5446usb	5765usb	6350usb
			10320usb	12133usb	13362usb
0900	1000		USA, WBOH Newport NC	5920am	
0900	1000		USA, WEWN Vandiver AL	9390as	
0900	1000	mtwhfa	USA, WHRI Cypress Creek SC	7315sa	

0900	1000	Sun	USA, WHRI Cypress Creek SC	11565pa	
0900	1000		USA, WHRI Cypress Creek SC	5875na	7385na
0900	1000		USA, WRMI Miami FL	9955am	
0900	1000		USA, WTJC Newport NC	9370na	
0900	1000		USA, WWCR Nashville TN	5070na	5890na
			9985na		
0900	1000		USA, WWRB Manchester TN	3185va	
0900	1000		USA, WYFR/Family Radio Worldwide		5950na
			6915na	9755as	
0900	1000	vl	Vanuatu, Radio Vanatu	7260do	
0900	1000		Zambia CVC/ The Voice Africa	6065af	13590af
0915	0930	Sat	Guam, KTWR/TWR		11840pa
0930	1000	Sun	Italy, NEXUS/IRRS	9510va	

1000 UTC - 6AM EDT / 5AM CDT / 3AM PDT

1000	1027		Czech Rep, Radio Prague	9955am	15710af
			21745af		
1000	1030		Vietnam, Voice of Vietnam	9840as	12020as
1000	1057		China, China Radio International		5995as
			7135as	7215as	9415as
			13720as	15190as	15210pa
			15350as	17490eu	17570eu
			17750as		17690pa
1000	1057		Netherlands, R Netherlands Worldwide		12065as
			15110as	11895as	
1000	1058		New Zealand, Radio NZ International		9765pa
1000	1058	DRM	New Zealand, Radio NZ International		9870pa
1000	1100		Anguilla, Worldwide Univ Network		11775am
1000	1100		Australia, ABC NT Alice Springs		2310do
			4835do		
1000	1100		Australia, ABC NT Katherine	2485do	
1000	1100		Australia, ABC NT Tennant Creek		2325do
1000	1100		Australia, CVC International	15555as	
1000	1100		Australia, Radio Australia	9475va	9580va
			9590va	11945as	12080as
1000	1100		Canada, CFRX Toronto ON	6070na	
1000	1100		Canada, CFVP Calgary AB	6030na	
1000	1100		Canada, CKZN St John's NF	6160na	
1000	1100		Canada, CKZU Vancouver BC	6160na	
1000	1100		Costa Rica, Worldwide Univ Network		7325va
			9725va		
1000	1100	DRM	Germany, Deutsche Welle	9545eu	13810eu
1000	1100		Guyana, Voice of Guyana	3291do	
1000	1100		India, All India Radio	7270as	13710pa
			15235as	15260as	17510as
			17895pa		
1000	1100		Indonesia, Voice of Indonesia	9526va	11784al
1000	1100	Sun	Italy, NEXUS/IRRS	9510va	
1000	1100		Malaysia, RTM/Traxx FM	7295as	
1000	1100		Nigeria, Radio Nigeria/Kaduna	4770do	
1000	1100		Nigeria, Voice of Nigeria/Lagos		9690af
1000	1100		North Korea, Voice of Korea	6185as	6285am
			9335am	9850as	
1000	1100		Palau, T8WH/World Harvest	9930as	12130as
1000	1100	vl	Papua New Guinea, R East New Britain		3385do
1000	1100	vl	Papua New Guinea, Wantok R. Light		7325va
1000	1100		Saudi Arabia, BSKSA	15250af	
1000	1100	vl	Solomon Islands, SIBC	5020do	
1000	1100	vl	South Africa, Channel Africa	9625af	
1000	1100	Sat/Sun	UK, BBC World Service	15400af	17830af
1000	1100		UK, BBC World Service	6190af	6195as
			9605as	9740as	9860af
			15310af	15575as	17640af
			21470af		17790as
1000	1100		Ukraine, R Ukraine International		9950eu
1000	1100		USA, American Forces Network		4319usb
			5446usb	5765usb	6350usb
			10320usb	12133usb	13362usb
1000	1100		USA, KNLS Anchor Point AK	6150as	
1000	1100		USA, WBOH Newport NC	5920am	
1000	1100		USA, WEWN Vandiver AL	9390as	
1000	1100	Sun	USA, WHRI Cypress Creek SC	11565pa	
1000	1100	mtwhfa	USA, WHRI Cypress Creek SC	7315sa	
1000	1100		USA, WHRI Cypress Creek SC	7385na	9865sa
1000	1100		USA, WINB Red Lion PA	9265am	
1000	1100		USA, WRMI Miami FL	9955am	
1000	1100		USA, WTJC Newport NC	9370na	
1000	1100		USA, WWCR Nashville TN	5070na	5890na
			15825na		
1000	1100		USA, WWRB Manchester TN	3185va	
1000	1100		USA, WYFR/Family Radio Worldwide		5950na
			6890na	6915na	9555as
1000	1100		Zambia CVC/ The Voice Africa	6065af	13590af
1015	1045	Sun	UK, Bible Voice Broadcasting	5910as	
1030	1100		Australia, HCJB Global	15400as	

1030	1100	Iran, VOIRI/IRIB	15600as	17660as
1030	1100	Mongolia, Voice of Mongolia	12085as	
1059	1100	New Zealand, Radio NZ International		13660pa

1100 UTC - 7AM EDT / 6AM CDT / 4AM PDT

1100	1103	mtwhf	Croatia, Voice of Croatia	9830eu	
1100	1130		Australia, CVC International	15555as	
1100	1130		Iran, VOIRI/IRIB	15600as	17660as
1100	1130	f/DRM	Japan, NHK World Radio Japan		9750eu
1100	1130		UK, BBC World Service	15400af	
1100	1130		Vietnam, Voice of Vietnam	7285as	
1100	1145		USA, WYFR/Family Radio Worldwide		9550am
			9755sa		
1100	1157		China, China Radio International	5960na	
			5995as	6060as	9570as
			11795as	13645as	13665eu
1100	1158	DRM	New Zealand, Radio NZ International	9870pa	
1100	1200		Anguilla, Worldwide Univ Network	11775am	
1100	1200		Australia, ABC NT Alice Springs	2310do	
			4835do		
1100	1200		Australia, ABC NT Katherine	2485do	
1100	1200		Australia, ABC NT Tennant Creek		2325do
1100	1200		Australia, HCJB Global	15400as	
1100	1200	DRM	Australia, Radio Australia	5995pa	
1100	1200		Australia, Radio Australia	6020va	9475as
			9560as	9580va	9590va
					11945as
1100	1200	Sat/Sun	Canada, CBC NQ SW Service	9625na	
1100	1200		Canada, CFRX Toronto ON	6070na	
1100	1200		Canada, CFVP Calgary AB	6030na	
1100	1200		Canada, CKZN St John's NF	6160na	
1100	1200		Canada, CKZU Vancouver BC	6160na	
1100	1200		Costa Rica, Worldwide Univ Network		7325va
			9725va		
1100	1200	DRM	Germany, Deutsche Welle	9545eu	13810eu
1100	1200	Sun	Italy, NEXUS/IRRS	9510va	
1100	1200		Malaysia, RTM/Traxx FM	7295as	
1100	1200		New Zealand, Radio NZ International		13660pa
1100	1200		Nigeria, Radio Nigeria/Kaduna	4770do	
1100	1200		Nigeria, Voice of Nigeria/Lagos		9690af
1100	1200		Palau, T8WH/World Harvest	9930as	12130as
1100	1200	vl	Papua New Guinea, R East New Britain	3385do	
1100	1200	vl	Papua New Guinea, Wantok R. Light		7325va
1100	1200		Romania, R Romania International		5210eu
			11775eu	11790af	15430af
1100	1200		Saudi Arabia, BSKSA	15250af	
1100	1200	vl	Solomon Islands, SIBC	5020do	9545al
1100	1200	vl	South Africa, Channel Africa	9625af	
1100	1200		Taiwan, R Taiwan International	7445as	11715as
1100	1200		UK, BBC World Service	6190af	6195as
			9605as	9740as	9860af
			15310as	15575me	17640af
			17830af	21470af	17790as
1100	1200		USA, American Forces Network		4319usb
			5446usb	5765usb	6350usb
			10320usb	12133usb	13362usb
1100	1200		USA, WBOH Newport NC	5920am	
1100	1200		USA, WEWN Vandiver AL	9390as	
1100	1200	mtwhfa	USA, WHRI Cypress Creek SC	7315sa	
1100	1200		USA, WHRI Cypress Creek SC	5875na	7385na
1100	1200		USA, WINB Red Lion PA	9265am	
1100	1200		USA, WRMI Miami FL	9955am	
1100	1200		USA, WTJC Newport NC	9370na	
1100	1200		USA, WWCR Nashville TN	7490na	9980na
			15825na		
1100	1200		USA, WWRB Manchester TN	3185va	
1100	1200		USA, WYFR/Family Radio Worldwide		5950af
			5985na	7730sa	9625sa
1100	1200		Zambia CVC/ The Voice Africa	6065af	13590af
1105	1200	Sun	Greece, Voice of Greece	9420eu	15605eu
1115	1130	mtwhfa	UK, Bible Voice Broadcasting	5945as	
1115	1145	Sun	UK, Bible Voice Broadcasting	5945as	
1130	1157		Czech Rep, Radio Prague	11640eu	17545af
1130	1200		Australia, CVC International	13635as	
1130	1200		Bulgaria, Radio Bulgaria	11700eu	15700eu
1130	1200		Vietnam, Voice of Vietnam	9840as	12020as
1145	1200		UK, Bible Voice Broadcasting	5945as	

1200 UTC - 8AM EDT / 7AM CDT / 5AM PDT

1200	1230		France, Radio France International	21620af
1200	1230		Germany, AWR-Europe	15435as
1200	1230		Japan, NHK World Radio Japan	6120na
			9625pa	9695as
				9790eu
1200	1230		Saudi Arabia, BSKSA	15250af
1200	1245		USA, WYFR/Family Radio Worldwide	5950na
			5985na	

1200	1257		China, China Radio International	5955as
			7250as	9460as
			9730as	9600as
			11760pa	11650as
			11980as	12080as
			13790eu	13665eu
			17490eu	
1200	1258		New Zealand, Radio NZ International	13660pa
1200	1300		Anguilla, Worldwide Univ Network	11775am
1200	1300		Australia, ABC NT Alice Springs	2310do
			4835do	
1200	1300		Australia, ABC NT Katherine	2485do
1200	1300		Australia, ABC NT Tennant Creek	2325do
1200	1300		Australia, CVC International	13635as
1200	1300		Australia, HCJB Global	15400as
1200	1300		Australia, Radio Australia	6020va
1200	1300		9560pa	9580va
1200	1300	DRM	Australia, Radio Australia	5995va
1200	1300	Sat/Sun	Canada, CBC NQ SW Service	9625na
1200	1300		Canada, CFRX Toronto ON	6070na
1200	1300		Canada, CFVP Calgary AB	6030na
1200	1300		Canada, CKZN St John's NF	6160na
1200	1300		Canada, CKZU Vancouver BC	6160na
1200	1300		Costa Rica, Worldwide Univ Network	7325va
			9725va	
1200	1300	DRM	Germany, Deutsche Welle	9545eu
1200	1300	Sun	Latvia, Radio SWH	9290eu
1200	1300		Malaysia, RTM/Traxx FM	7295as
1200	1300		Nigeria, Radio Nigeria/Kaduna	4770do
1200	1300		Nigeria, Voice of Nigeria/Lagos	9690af
1200	1300		Palau, T8WH/World Harvest	9930as
1200	1300	vl	Papua New Guinea, Wantok R. Light	7325va
1200	1300	vl	Solomon Islands, SIBC	5020do
1200	1300		South Korea, KBS World Radio	9545al
1200	1300	f/DRM	Taiwan, R Taiwan International	9850eu
1200	1300		UK, BBC World Service	5975as
			9605as	9740as
			15310as	15575me
			17640af	17790as
1200	1300		Ukraine, R Ukraine International	9950eu
1200	1300		USA, American Forces Network	4319usb
			5446usb	5765usb
			10320usb	12133usb
				13362usb
1200	1300		USA, KNLS Anchor Point AK	6150as
1200	1300		USA, Voice of America	7575va
			9345va	9640va
				11705va
			15190va	
1200	1300		USA, WBOH Newport NC	5920am
1200	1300		USA, WEWN Vandiver AL	5755va
1200	1300		USA, WHRA Greenbush ME	15665af
1200	1300	Sat	USA, WHRI Cypress Creek SC	7315sa
1200	1300	mtwhf	USA, WHRI Cypress Creek SC	7335sa
1200	1300	Sun	USA, WHRI Cypress Creek SC	9410sa
1200	1300		USA, WHRI Cypress Creek SC	7335na
1200	1300		USA, WINB Red Lion PA	9265am
1200	1300		USA, WRMI Miami FL	9955am
1200	1300		USA, WTJC Newport NC	9370na
1200	1300		USA, WWCR Nashville TN	7490na
			15825na	
1200	1300		USA, WWRB Manchester TN	3185va
1200	1300		USA, WYFR/Family Radio Worldwide	17555am
			17795na	
1200	1300		Zambia CVC/ The Voice Africa	6065af
1215	1300		Egypt, Radio Cairo	17840as
1230	1257		China, China Radio International	11780as
1230	1300		Bangladesh, Bangla Betar	7250as
1230	1300		Thailand, Radio Thailand World Svc	9810va
1230	1300		Vietnam, Voice of Vietnam	9840as
				12020as

1300 UTC - 9AM EDT / 8AM CDT / 6AM PDT

1300	1330		Australia, HCJB Global	15540as
1300	1330		Egypt, Radio Cairo	17840as
1300	1330		Poland, Polish Radio	7325eu
1300	1357		China, China Radio International	5955as
			7300as	9590na
			9765as	9870as
			11900pa	11760pa
			11980as	13610eu
			15230na	13790eu
1300	1400		Anguilla, Worldwide Univ Network	11775am
1300	1400		Australia, CVC International	13635as
1300	1400		Australia, Radio Australia	6020va
			9580va	9590va
1300	1400	DRM	Australia, Radio Australia	5995va
1300	1400	Sat/Sun	Canada, CBC NQ SW Service	9625na
1300	1400		Canada, CFRX Toronto ON	6070na
1300	1400		Canada, CFVP Calgary AB	6030na
1300	1400		Canada, CKZN St John's NF	6160na
1300	1400		Canada, CKZU Vancouver BC	6160na
1300	1400		Costa Rica, Worldwide Univ Network	7325va

1300	1400	DRM	9725va		
1300	1400		Germany, Deutsche Welle	13810eu	
1300	1400		Indonesia, Voice of Indonesia	9526va	11784al
1300	1400		Malaysia, RTM/Traxx FM	7295as	
1300	1400		New Zealand, Radio NZ International		6170pa
1300	1400		Nigeria, Radio Nigeria/Kaduna	4770do	
1300	1400		Nigeria, Voice of Nigeria/Lagos		9690af
1300	1400		North Korea, Voice of Korea	7570eu	9335na
			11710na	12015eu	
1300	1400		Palau, T8WH/World Harvest	9930as	
1300	1400	vl	Papua New Guinea, Wantok R. Light		7325va
1300	1400	vl	Solomon Islands, SIBC	5020do	9545al
1300	1400		South Korea, KBS World Radio		9570na
			9770as		
1300	1400		UK, BBC World Service	5975as	6190af
			6195as	9410as	9740as
			11760me	15310as	15420af
			17640af	21470af	15575me
1300	1400		USA, American Forces Network		4319usb
			5446usb	5765usb	6350usb
			10320usb	12133usb	13362usb
1300	1400		USA, Voice of America	7575va	9640va
			11705va		
1300	1400		USA, WBOH Newport NC	5920am	
1300	1400		USA, WEWN Vandiver AL	5755va	
1300	1400		USA, WHRA Greenbush ME	15665af	
1300	1400	Sat/Sun	USA, WHRI Cypress Creek SC	9495sa	9840na
1300	1400		USA, WHRI Cypress Creek SC	11785na	
1300	1400		USA, WINB Red Lion PA	9265am	
1300	1400		USA, WRMI Miami FL	9955am	
1300	1400		USA, WTJC Newport NC	9370na	
1300	1400		USA, WWCR Nashville TN	7490na	9980na
			15825na		
1300	1400		USA, WWRB Manchester TN	9385va	
1300	1400		USA, WYFR/Family Radio Worldwide		11830am
			11865na	11910na	17795na
1300	1400		Zambia CVC/ The Voice Africa	6065af	13590af
1310	1340		Japan, NHK World Radio Japan		11985as
1330	1357	fa/ DRM	Czech Rep, Radio Prague	9850eu	
1330	1400		Australia, HCJB Global	15435as	
1330	1400	mtwhfa	Guam, KSDA/ AWR	15275as	
1330	1400	hfa	Guam, KSDA/ AWR	11880as	
1330	1400		India, All India Radio	9690as	11620as
			13710as		
1330	1400		Laos, National Radio	7145as	
1330	1400		Sweden, Radio Sweden	15735va	
1330	1400		Turkey, Voice of Turkey	11735pa	12035eu
1330	1400		Vietnam, Voice of Vietnam	9840as	12020as

1400 UTC - 10AM EDT / 9AM CDT / 7AM PDT

1400	1425		Turkey, Voice of Turkey	11735pa	12035eu
1400	1427		Czech Rep, Radio Prague	11600as	13580na
1400	1428		Serbia, Intl Radio Serbia	7200eu	
1400	1430		Australia, HCJB Global	15400as	15425as
1400	1430		Australia, Radio Australia	5995va	6080va
			7240va	9590va	
1400	1430	sw	Germany, Pan American BC	15205as	
1400	1430		Japan, NHK World Radio Japan		11705as
			11985as	13630eu	21560af
1400	1430	DRM/ Sat	New Zealand, Radio NZ International		9750pa
1400	1430		Thailand, Radio Thailand World Svc		9725va
1400	1430	Sun	United Arab Emirates, FEBA	12025as	
1400	1457		China, China Radio International		5995as
			7300as	9460as	9700eu
			9795as	11665as	11675na
			13740na	15230na	17630af
1400	1457		Netherlands, R Netherlands Worldwide		5825as
			7530as	9345as	11835as
1400	1500		Anguilla, Worldwide Univ Network		11775am
1400	1500		Australia, CVC International	13635as	
1400	1500		Bhutan, Bhutan Broadcasting Svc		6035as
1400	1500	Sat/Sun	Canada, CBC NQ SW Service	9625na	
1400	1500		Canada, CFRX Toronto ON	6070na	
1400	1500		Canada, CFVP Calgary AB	6030na	
1400	1500		Canada, CKZN St John's NF	6160na	
1400	1500		Canada, CKZU Vancouver BC	6160na	
1400	1500		Costa Rica, Worldwide Univ Network		7325va
			9725va		
1400	1500		Germany, CVC Intl/Voice Africa		15745af
1400	1500	DRM	Germany, Deutsche Welle	15780eu	
1400	1500		Germany, Overcomer Ministries		6110eu
			13810eu		
1400	1500		India, All India Radio	9690as	11620as
			13710as		
1400	1500		Jordan, Radio Jordan	11690na	
1400	1500		Libya, Voice of Africa	17725af	21695af
1400	1500		Malaysia, RTM/Traxx FM	7295as	

1400	1500		New Zealand, Radio NZ International		6170pa
1400	1500		Nigeria, Radio Nigeria/Kaduna	4770do	
1400	1500		Nigeria, Voice of Nigeria/Lagos		9690af
1400	1500		Oman, Radio Oman	15140as	
1400	1500		Palau, T8WH/World Harvest	9930as	9955as
1400	1500	vl	Papua New Guinea, Wantok R. Light		7325va
1400	1500	vl	Solomon Islands, SIBC	5020do	9545al
1400	1500		UK, BBC World Service	5960as	5975as
			6190af	6195as	9410as
			9860af	11760me	11915as
			21470af		
1400	1500	Sat/Sun	UK, Bible Voice Broadcasting	15680as	
1400	1500		USA, American Forces Network		4319usb
			5446usb	5765usb	6350usb
			10320usb	12133usb	13362usb
1400	1500		USA, KJES Vado NM	11715na	
1400	1500		USA, KNLS Anchor Point AK	6150as	
1400	1500		USA, Voice of America	4930af	6080af
			7575va	9480va	9760va
			12150va	15205va	15580af
			17750af		17715af
1400	1500		USA, WBOH Newport NC	5920am	
1400	1500		USA, WEWN Vandiver AL	5755va	
1400	1500		USA, WHRA Greenbush ME	15665af	
1400	1500	Sat/Sun	USA, WHRI Cypress Creek SC	9495sa	9840na
1400	1500		USA, WHRI Cypress Creek SC	11785na	
1400	1500		USA, WINB Red Lion PA	13570am	
1400	1500		USA, WRMI Miami FL	9955na	
1400	1500		USA, WTJC Newport NC	9370na	
1400	1500		USA, WWCR Nashville TN	7490na	9980na
			15825na		
1400	1500		USA, WWRB Manchester TN	9385va	
1400	1500		USA, WYFR/Family Radio Worldwide		11830am
			11910na	13695as	17795na
1400	1500		Zambia CVC/ The Voice Africa	6065af	13650af
1415	1430	mtwhfa	Germany, Pan American BC	15205as	
1415	1430		Nepal, Radio Nepal	5005as	
1415	1450		Guam, KTW/TWR	9975as	
1430	1445	Sun	Germany, Pan American BC	15205as	
1430	1445	vl/ mtwhf	Moldova, Radio PMR/Pridnestrovie		7370eu
1430	1500		Australia, Radio Australia	5995va	6080va
			7240va	9475as	9590va
1430	1500		China, Central People's BS/CNR		6010do
			7350do	9480do	
1430	1500		Ethiopia, Radio Ethiopia	5990af	7110af
			9704af		
1430	1500	f/ DRM	South Korea, KBS World Radio		9750eu
1430	1500		Sweden, Radio Sweden	13820va	

1500 UTC - 11AM EDT / 10AM CDT / 8AM PDT

1500	1510	mtwhfa	Turkmenistan, Turkmen Radio	5015eu	
1500	1515	Sun	UK, Bible Voice Broadcasting	15680as	
1500	1527		Czech Rep, Radio Prague	9955na	
1500	1528		Vietnam, Voice of Vietnam	7285va	9840va
			12020va		
1500	1530		Australia, HCJB Global	15425as	
1500	1530		Guam, KSDA/ AWR	11720as	
1500	1530		Nigeria, Radio, National Svc/Abuja		7275do
1500	1530		UK, BBC World Service	9410af	11860af
			15105af		
1500	1530	Sat	UK, Bible Voice Broadcasting	15295as	
1500	1530		UK, Sudan Radio Service	17745af	
1500	1545		USA, WYFR/Family Radio Worldwide		15770sa
1500	1550		New Zealand, Radio NZ International		6170pa
1500	1557		Canada, R Canada International		9635as
			11975as		
1500	1557		China, China Radio International		5955as
			6095va	7160as	7325as
			9525eu	9720va	9785as
			13685af	13740na	17630af
1500	1557		Libya, Voice of Africa		21695af
1500	1557		Netherlands, R Netherlands Worldwide		5825as
			7530as	11835as	15815as
1500	1600		Anguilla, Worldwide Univ Network		11775am
1500	1600		Australia, CVC International	11730as	
1500	1600		Australia, Radio Australia	5995va	6080va
1500	1600		Costa Rica, Worldwide Univ Network		7325va
			9725va		
1500	1600	Sat/Sun	Canada, CBC NQ SW Service	9625na	
1500	1600		Canada, CFRX Toronto ON	6070na	
1500	1600		Canada, CFVP Calgary AB	6030na	
1500	1600		Canada, CKZN St John's NF	6160na	
1500	1600		Canada, CKZU Vancouver BC	6160na	
1500	1600		Costa Rica, Worldwide Univ Network		7325va
			9725va		
1500	1600		Germany, CVC Intl/Voice Africa		15745af
1500	1600	DRM	Germany, Deutsche Welle	15780eu	
1500	1600		Germany, Overcomer Ministries		6110eu

1500	1600		13810me	17485af	
1500	1600		Italy, NEXUS/IRRS	15650af	
1500	1600		Jordan, Radio Jordan	11690na	
1500	1600		Malaysia, RTM/Traxx FM	7295as	
1500	1600		Myanmar, Myanma Radio	5985as	
1500	1600		Nigeria, Radio Nigeria/Kaduna	4770do	
1500	1600		Nigeria, Voice of Nigeria/Lagos	9690af	
1500	1600		North Korea, Voice of Korea	7570eu	9335na
			11710na	12015eu	
1500	1600		Palau, T8WH/World Harvest	9930as	
1500	1600	vl	Papua New Guinea, Wantok R. Light	7325va	
1500	1600		Russia, Voice of Russia	7350as	7260as
			9660as		
1500	1600	DRM	Russia, Voice of Russia	5905eu	9675eu
1500	1600	vl	Solomon Islands, SIBC	5020do	9545al
1500	1600	vl	South Africa, Channel Africa	9625af	
1500	1600		Uganda, Dunamis Shortwave	4750af	
1500	1600	DRM	UK, BBC World Service	5970eu	
1500	1600		UK, BBC World Service	5975as	6040as
			6190af	6195as	9410as
			9855va	9860af	11915me
			15400af	21470af	
1500	1600		USA, American Forces Network		4319usb
			5446usb	5765usb	6350usb
			10320usb	12133usb	13362usb
1500	1600		USA, KJES Vado NM	11715na	
1500	1600		USA, Voice of America	4930af	6080af
			6140af	7520va	7575va
			9685va	9760va	11525va
			12150va	13735va	15460va
			17715af	17895af	15580af
1500	1600		USA, WBCQ Monticello ME	9330am	
1500	1600		USA, WBOH Newport NC	5920am	
1500	1600		USA, WEWN Vandiver AL	5755va	
1500	1600	mtwhfa	USA, WHRA Greenbush ME	15665af	
1500	1600	Sun	USA, WHRA Greenbush ME	13650af	
1500	1600	Sat/Sun	USA, WHRI Cypress Creek SC	9495sa	9840na
1500	1600		USA, WHRI Cypress Creek SC	11785na	
1500	1600		USA, WINB Red Lion PA	13570am	
1500	1600		USA, WRMI Miami FL	9955na	
1500	1600		USA, WTJC Newport NC	9370na	
1500	1600		USA, WWCR Nashville TN	7490na	9980na
			15825na		
1500	1600		USA, WWRB Manchester TN	9385va	
1500	1600		USA, WYFR/Family Radio Worldwide		11830am
			11910na	17795na	
1500	1600		Zambia CVC/ The Voice Africa	6065af	13650af
1505	1600	DRM	Canada, R Canada International		9610na
			9800na		
1507	1600		Canada, R Canada International		9610as
1507	1600	DRM	Canada, R Canada International		9800na
1515	1530	vl/ mtwhf	Moldova, Radio PMR/Pridnestrovie	7370eu	
1530	1557		China, China Radio International		9600me
1530	1600	mtwhfa	Albania, Radio Tirana	13720na	
1530	1600		Egypt, Radio Cairo	15245eu	
1530	1600		Germany, AWR-Europe	15335as	
1530	1600		Iran, VOIRI/ IRIB	7305as	9600as
1530	1600		Mongolia, Voice of Mongolia	12085as	
1530	1600		Sweden, Radio Sweden	13600va	
1530	1600	Sat	UK, BBC World Service	9410af	11860af
			15105af		
1530	1600	Sun	UK, Bible Voice Broadcasting	13590me	
1530	1600		UK, Bible Voice Broadcasting	15680as	
1530	1600	Sat	UK, Bible Voice Broadcasting	15680as	
1545	1600	mtwhfa	UK, Bible Voice Broadcasting	13590me	
1551	1600	DRM	New Zealand, Radio NZ International		7285pa
1551	1600		New Zealand, Radio NZ International		6170pa

1600 UTC - 12PM EDT / 11AM CDT / 9AM PDT

1600	1615	vl/ mtwhf	Moldova, Radio PMR/Pridnestrovie	7370eu	
1600	1615		Pakistan, Radio Pakistan	9385va	11565va
			15100af		
1600	1615	Sat	UK, BBC World Service	9410af	11860af
			15105af		
1600	1615		UK, Bible Voice Broadcasting	13590me	
1600	1620	t	UK, Bible Voice Broadcasting	13590me	
1600	1628		Vietnam, Voice of Vietnam	7220va	7280va
			9550va	9730va	
1600	1630	Sun	Germany, Pan American BC	13830me	
1600	1630		Guam, KSDA/ AWR	11720as	11805as
1600	1630		Iran, VOIRI/ IRIB	7305as	9600as
1600	1630		Myanmar, Myanma Radio	9730do	
1600	1630		Nigeria, Voice of Nigeria/Lagos		9690af
1600	1630		Yemen, Rep of Yemen Radio	9780me	
1600	1645		USA, WYFR/Family Radio Worldwide		11830am
			11865na		
1600	1650	DRM	New Zealand, Radio NZ International		7285pa

1600	1650		New Zealand, Radio NZ International		6170pa
1600	1657		China, China Radio International		6060as
			7110af	7235as	7255eu
			9525eu	9600af	11650eu
1600	1700		Anguilla, Worldwide Univ Network		11775am
1600	1700		Australia, CVC International		9680as
1600	1700		Australia, Radio Australia	5995va	6080va
			7240as	9475va	9580va
			11660pa		
1600	1700	Sat	Canada, CBC NQ SW Service	9625na	
1600	1700		Canada, CFRX Toronto ON	6070na	
1600	1700		Canada, CFVP Calgary AB	6030na	
1600	1700		Canada, CKZN St John's NF	6160na	
1600	1700		Canada, CKZU Vancouver BC	6160na	
1600	1700		Canada, R Canada International		9610as
1600	1700	DRM	Canada, R Canada International		9610na
			9800na		
1600	1700		Costa Rica, Worldwide Univ Network		7325va
			9725va		
1600	1700		Egypt, Radio Cairo	12170af	
1600	1700		Ethiopia, Radio Ethiopia	7165af	9560af
1600	1700		France, Radio France International		15605af
1600	1700		Germany, CVC Intl/Voice Africa		15745af
1600	1700		Germany, Deutsche Welle	9485as	9540as
			15640as		
1600	1700	DRM	Germany, Deutsche Welle		11810eu
1600	1700		Italy, NEXUS/IRRS	15650af	
1600	1700		Malaysia, RTM/Traxx FM	7295as	
1600	1700		Netherlands, R Netherlands Worldwide		13570af
1600	1700		Nigeria, Radio Nigeria/Kaduna	4770do	
1600	1700		North Korea, Voice of Korea	9990va	11545va
1600	1700		Palau, T8WH/World Harvest	9930as	
1600	1700	vl	Papua New Guinea, Wantok R. Light		7325va
1600	1700		Russia, Voice of Russia	4965va	4975va
			6130eu	7260as	7305as
			9470va		7320as
1600	1700	vl	Rwanda, Radio Rwanda	6055do	
1600	1700	vl	Solomon Islands, SIBC	5020do	9545al
1600	1700		South Korea, KBS World Radio		9515eu
1600	1700		Taiwan, R Taiwan International	11550as	11995as
1600	1700		Uganda, Dunamis Shortwave	4750af	
1600	1700		UK, BBC World Service	3995eu	
1600	1700	DRM/ vl	UK, BBC World Service	3255af	5975as
			6190af	7355as	9740as
			15400af	15420af	21470af
1600	1700	Sun	UK, Bible Voice Broadcasting		13590me
1600	1700		USA, American Forces Network		4319usb
			5446usb	5765usb	6350usb
			10320usb	12133usb	13362usb
1600	1700		USA, Voice of America	4930af	6080af
			9345va	13600va	15445va
			1715af	17895af	15580af
1600	1700		USA, WBCQ Monticello ME	9330am	
1600	1700		USA, WBOH Newport NC	5920am	
1600	1700		USA, WEWN Vandiver AL	5755va	
1600	1700		USA, WHRA Greenbush ME	17650af	
1600	1700		USA, WHRI Cypress Creek SC	9495sa	9840va
			11785na		
1600	1700		USA, WINB Red Lion PA	13570am	
1600	1700		USA, WRMI Miami FL	9955na	
1600	1700		USA, WTJC Newport NC	9370na	
1600	1700		USA, WWCR Nashville TN	9980na	12160na
			15825na		
1600	1700		USA, WWRB Manchester TN	9385va	
1600	1700		USA, WYFR/Family Radio Worldwide		6085sa
			13695as	17795na	18980af
			21525af		21455eu
1600	1700		Zambia CVC/ The Voice Africa	6065af	13650af
1605	1700		Canada, R Canada International		9610as
1615	1700	Sat/Sun	UK, BBC World Service	9410af	11860af
			15105af		
1615	1700		UK, Bible Voice Broadcasting	13590me	
1630	1645		UK, Bible Voice Broadcasting	13590me	
1630	1700		Guam, KSDA/ AWR	6190as	
1630	1700		Nigeria, Voice of Nigeria/Lagos		15120af
1640	1650	mtwhfa	Turkmenistan, Turkmen Radio	4930eu	
1645	1700	vl/ mtwhf	Moldova, Radio PMR/Pridnestrovie		7370eu
1645	1700		Tajikistan, Tajik Radio	7245as	
1651	1700	DRM	New Zealand, Radio NZ International		7285pa
1651	1700		New Zealand, Radio NZ International		6170pa

1700 UTC - 1PM EDT / 12PM CDT / 10AM PDT

1700	1704	DRM	Canada, R Canada International		9610na
			9800na		
1700	1705	Sun	Croatia, Voice of Croatia	6165eu	
1700	1715	mtwhfa	Croatia, Voice of Croatia	6165eu	
1700	1715	t/ vl	UK, Bible Voice Broadcasting	13590me	

1700	1727	Czech Rep, Radio Prague	5930eu	15710af
1700	1730	Australia, CVC International	9680as	
1700	1730	Jordan, Radio Jordan	11690na	
1700	1730	UK, Bible Voice Broadcasting	13590me	
1700	1730	Sat USA, WRMI Miami FL	9955am	
1700	1745	UK, BBC World Service	9410af	11860af
1700	1750	DRM New Zealand, Radio NZ International	7285pa	
1700	1750	New Zealand, Radio NZ International	6170pa	
1700	1757	China, China Radio International	6090as	
		6100va 6140as 7100me 7120as		
		7130as 7180as 7205eu 7255eu		
		7335eu 9600me		
1700	1800	Anguilla, Worldwide Univ Network	11775am	
1700	1800	Australia, Radio Australia	5995va 6080va	
		9475as 9580va 9710as 11880as		
1700	1800	Sat Canada, CBC NQ SW Service	9625na	
1700	1800	Canada, CFRX Toronto ON	6070na	
1700	1800	Canada, CFVP Calgary AB	6030na	
1700	1800	Canada, CKZN St John's NF	6160na	
1700	1800	Canada, CKZU Vancouver BC	6160na	
1700	1800	Canada, R Canada International	9610as	
1700	1800	Costa Rica, Worldwide Univ Network	7325va	
		9725va		
1700	1800	Egypt, Radio Cairo	12170af	
1700	1800	Equatorial Guinea, Radio Africa		15190af
1700	1800	Germany, CVC Intl/Voice Africa	15745af	
1700	1800	DRM Germany, Deutsche Welle	5790eu 9960eu	
1700	1800	Italy, NEXUS/IRRS	15650af	
1700	1800	Malaysia, RTM/Traxx FM	7295as	
1700	1800	Nigeria, Radio Nigeria/Kaduna	4770do	
1700	1800	Nigeria, Voice of Nigeria/Lagos		15120af
1700	1800	Palau, T8WH/World Harvest	9930as	
1700	1800	vl Papua New Guinea, Wantok R. Light	7325va	
1700	1800	Romania, R Romania International	9535eu	
		11735eu		
1700	1800	Russia, Voice of Russia	4975me 6175as	
		7125as 7320eu 9470va		
1700	1800	vl Rwanda, Radio Rwanda	6055do	
1700	1800	vl Solomon Islands, SIBC	5020eu 9545al	
1700	1800	vl South Africa, Channel Africa	15235af	
1700	1800	Taiwan, R Taiwan International	15690eu	
1700	1800	Uganda, Dunamis Shortwave	4750af	
1700	1800	UK, BBC World Service	3255af 5975as	
		6190af 7355as 9740as 11665af		
		12095af 15400af		
1700	1800	DRM/ vl UK, BBC World Service	3995eu	
1700	1800	Sat UK, Bible Voice Broadcasting	9430me	
1700	1800	Sun UK, Bible Voice Broadcasting	13590me	
1700	1800	USA, American Forces Network	4319usb	
		5446usb 5765usb 6350usb 7811usb		
		10320usb 12133usb		
1700	1800	USA, Voice of America	6080af 13710af	
		15580af 17895af		
1700	1800	USA, WBOH Newport NC	5920am	
1700	1800	USA, WEWN Vandiver AL	15610eu	
1700	1800	USA, WHRA Greenbush ME	17650af	
1700	1800	USA, WHRI Cypress Creek SC	9495sa 9840va	
		11785na		
1700	1800	USA, WINB Red Lion PA	13570am	
1700	1800	USA, WRMI Miami FL	9955am	
1700	1800	USA, WTJC Newport NC	9370na	
1700	1800	USA, WWCR Nashville TN	9980na 12160na	
		15825na		
1700	1800	USA, WWRB Manchester TN	9385va	
1700	1800	USA, WYFR/Family Radio Worldwide	13690na	
		17795na 18980af 21455eu		
1700	1800	Zambia CVC/ The Voice Africa	4965af 9420af	
1715	1730	Vatican City, Vatican Radio	4005eu 5885eu	
		7250eu 7290eu 9645eu		
1730	1800	Bulgaria, Radio Bulgaria	5900eu 7400eu	
1730	1800	DRM Bulgaria, Radio Bulgaria	9400eu	
1730	1800	Slovakia, R Slovakia International	5915eu	
		6055eu		
1730	1800	UK, Bible Voice Broadcasting	13590me	
1730	1800	Sun UK, Bible Voice Broadcasting	9430me	
1730	1800	mtwhf UK, Sudan Radio Service	9840af	
1730	1800	Vatican City, Vatican Radio	9755af 11625af	
		13765af		
1745	1800	Bangladesh, Bangla Betar	7250as	
1745	1800	India, All India Radio	7410eu 9445af	
		9950eu 11620eu 11935af 15075af		
		15155af 17670af		
1745	1800	UK, Bible Voice Broadcasting	13590me	
1751	1800	DRM New Zealand, Radio NZ International	7285pa	
1751	1800	New Zealand, Radio NZ International	6170pa	

1800 UTC - 2PM EDT / 1PM CDT / 11AM PDT

1800	1804	Canada, R Canada International	9610as	
1800	1815	Sat UK, Bible Voice Broadcasting	11970as	
1800	1815	Sun UK, Bible Voice Broadcasting	13590me	
1800	1825	Vietnam, Voice of Vietnam	5955eu	
1800	1827	Czech Rep, Radio Prague	5930eu	9400va
1800	1830	Nigeria, Radio, National Svc/Abuja	7275do	
1800	1830	South Africa, AWR Africa	3215af 3345af	
		9610af		
1800	1830	UK, BBC World Service	7260as 9740as	
1800	1830	UK, Bible Voice Broadcasting	13590me	
1800	1830	Sat UK, Bible Voice Broadcasting	9430me	
1800	1830	mtwhf USA, Voice of America	4930af 12080af	
		15775af		
1800	1845	Sun UK, Bible Voice Broadcasting	9430me	
1800	1845	Sat UK, Bible Voice Broadcasting	6130va	
1800	1850	New Zealand, Radio NZ International	6170pa	
1800	1850	DRM New Zealand, Radio NZ International	7285pa	
1800	1857	China, China Radio International	6020eu	
		6100eu 6165me 7100eu 7265eu		
1800	1857	Netherlands, R Netherlands Worldwide	6020af	
		15535af		
1800	1859	Canada, R Canada International	7185af	
		11875af 13650af 15365af		
1800	1900	Anguilla, Worldwide Univ Network	11775am	
1800	1900	mtwhf Argentina, Radio Nacional RAE	9690eu 15345eu	
1800	1900	Australia, Radio Australia	6080va 7240as	
		9475va 9580as 9710as 11880as		
1800	1900	Bangladesh, Bangla Betar	7250eu	
1800	1900	Canada, CFRX Toronto ON	6070na	
1800	1900	Canada, CFVP Calgary AB	6030na	
1800	1900	Canada, CKZN St John's NF	6160na	
1800	1900	Canada, CKZU Vancouver BC	6160na	
1800	1900	Costa Rica, Worldwide Univ Network	7325va	
		9725va		
1800	1900	Equatorial Guinea, Radio Africa	15190af	
1800	1900	Germany, CVC Intl/Voice Africa	11775af	
1800	1900	DRM Germany, Deutsche Welle	5790eu 9960eu	
1800	1900	India, All India Radio	7410eu 9445af	
		9950eu 11620eu 11935af 15075af		
		15155af 17670af		
1800	1900	fas Italy, NEXUS/IRRS	7290va	
1800	1900	Kuwait, Radio Kuwait	11990va	
1800	1900	Malaysia, RTM/Traxx FM	7295as	
1800	1900	Nigeria, Radio Nigeria/Kaduna	4770do	
1800	1900	Nigeria, Voice of Nigeria/Lagos	15120af	
1800	1900	North Korea, Voice of Korea	7570eu 12015eu	
1800	1900	Palau, T8WH/World Harvest	9930as 9955as	
1800	1900	vl Papua New Guinea, Wantok R. Light	7325va	
1800	1900	Poland, Polish Radio	7345eu	
1800	1900	DRM Poland, Polish Radio	6015eu	
1800	1900	Russia, Voice of Russia	4975me 6125as	
		7230af 7240eu 7320eu 7335va		
		11510af		
1800	1900	Sat/Sun Russia, Voice of Russia	6055eu 6175eu	
		6245eu		
1800	1900	vl Rwanda, Radio Rwanda	6055do	
1800	1900	vl Solomon Islands, SIBC	5020do 9545al	
1800	1900	South Korea, KBS World Radio	7275eu	
1800	1900	Swaziland, TWR	3200af	
1800	1900	Taiwan, R Taiwan International	3965eu	
1800	1900	Uganda, Dunamis Shortwave	4750af	
1800	1900	DRM/ vl UK, BBC World Service	3995eu	
1800	1900	UK, BBC World Service	3255af 5875eu	
		5945me 5955va 6190af 7390eu		
		9630af 12095af 15400af 15420af		
1800	1900	Sun UK, Bible Voice Broadcasting	6130va	
1800	1900	USA, American Forces Network	4319usb	
		5446usb 5765usb 6350usb 7811usb		
		10320usb 12133usb		
1800	1900	USA, Voice of America	4930af 6080af	
		11975af 13710af 15580af 17895af		
1800	1900	USA, WBCQ Monticello ME	15420am	
1800	1900	USA, WBOH Newport NC	5920am	
1800	1900	USA, WEWN Vandiver AL	15610eu	
1800	1900	mtwhf USA, WHRA Greenbush ME	15665af	
1800	1900	Sat USA, WHRA Greenbush ME	13730af	
1800	1900	Sun USA, WHRA Greenbush ME	17650af	
1800	1900	mtwhf USA, WHRI Cypress Creek SC	17650va	
1800	1900	Sat/Sun USA, WHRI Cypress Creek SC	9495va	
1800	1900	USA, WHRI Cypress Creek SC	9840va 11785na	
1800	1900	USA, WINB Red Lion PA	13570am	
1800	1900	USA, WRMI Miami FL	9955am	
1800	1900	USA, WTJC Newport NC	9370na	
1800	1900	USA, WWCR Nashville TN	9980na 12160na	
		15825na		
1800	1900	USA, WWRB Manchester TN	9385va	

1800	1900	USA, WYFR/Family Radio Worldwide	13615am
		13690af 17795na 17845af	18980eu
1800	1900	Yemen, Rep of Yemen Radio	9780me
1800	1900	Zambia CVC/ The Voice Africa	4965af 9420af
1830	1900	UK, BBC World Service	6005af 9410af
1830	1900	f UK, Bible Voice Broadcasting	9430me
1845	1900	UK, Bible Voice Broadcasting	11830af
1851	1900	DRM New Zealand, Radio NZ International	9890pa
1851	1900	New Zealand, Radio NZ International	11725pa

1900 UTC - 3PM EDT / 2PM CDT / 12PM PDT

1900	1928	Vietnam, Voice of Vietnam	7280va	9730va
1900	1930	Germany, Deutsche Welle	6150af	11795af
		15620af 17860af		
1900	1935	New Zealand, Radio NZ International	11725pa	
1900	1935	DRM New Zealand, Radio NZ International	9890pa	
1900	1945	India, All India Radio	7410eu	9445af
		9950eu 11620eu 11935af	15075af	
		15155af 17670af		
1900	1945	USA, WYFR/Family Radio Worldwide	6085sa	
1900	1957	China, China Radio International	7285eu	
		7295va 9440va		
1900	1957	Netherlands, R Netherlands Worldwide	5905af	
		7425af 9480af 11660af	15335af	
		15535af		
1900	2000	Anguilla, Worldwide Univ Network	11775am	
1900	2000	Australia, Radio Australia	6080va	7240as
		9500va 9580va 9710as	11880as	
1900	2000	Canada, CFRX Toronto ON	6070na	
1900	2000	Canada, CFVP Calgary AB	6030na	
1900	2000	Canada, CKZN St John's NF	6160na	
1900	2000	Canada, CKZU Vancouver BC	6160na	
1900	2000	Egypt, Radio Cairo 9310af	11530af	
1900	2000	Equatorial Guinea, Radio Africa	15190af	
1900	2000	Germany, CVC Intl/Voice Africa	11775af	
1900	2000	DRM Germany, Deutsche Welle	3995eu	5875eu
1900	2000	Germany, Overcomer Ministries	6175eu	
1900	2000	Italy, NEXUS/IRRS 7290va		
1900	2000	fas Kuwait, Radio Kuwait	11990va	
1900	2000	Malaysia, RTM/Traxx FM	7295as	
1900	2000	Nigeria, Radio Nigeria/Kaduna	4770do	
1900	2000	Nigeria, Voice of Nigeria/Lagos	15120af	
1900	2000	North Korea, Voice of Korea	7100af	9975va
		11535va 11910af		
1900	2000	Palau, T8WH/World Harvest	9930as	
1900	2000	vi Papua New Guinea, Wantok R. Light	7325va	
1900	2000	Russia, Voice of Russia	6175eu	7240eu
		7290eu 7335af 11510af		
1900	2000	vi Rwanda, Radio Rwanda	6055do	
1900	2000	vi Solomon Islands, SIBC	5020do	
1900	2000	vi South Africa, Channel Africa	3345af	
1900	2000	mtwhf Spain, Radio Exterior Espana	9605af	9690eu
1900	2000	Swaziland, TWR 3200af		
1900	2000	Thailand, Radio Thailand World Svc	9805eu	
1900	2000	vi Uganda, UBC Radio	4976do	5026do
1900	2000	UK, BBC World Service	3995eu	
1900	2000	UK, BBC World Service	3255af	5875eu
		5945me 5955va 6190af	7390eu	
		9630af 12095af 15400af		
1900	2000	UK, Bible Voice Broadcasting	11830af	
1900	2000	USA, American Forces Network	4319usb	
		5446usb 5765usb 6350usb	7811usb	
		10320usb 12133usb 13362usb		
1900	2000	USA, KJES Vado NM	15385na	
1900	2000	USA, Voice of America	4930af	4940af
		6080af 9785va 11975af	12020va	
		13710af 15580af 17895af		
1900	2000	mtwhf USA, WBCQ Monticello ME	7415am	9330am
1900	2000	USA, WBCQ Monticello ME	15420am	
1900	2000	USA, WBOH Newport NC	5920am	
1900	2000	USA, WEWN Vandiver AL	15610eu	
1900	2000	mtwhf USA, WHRA Greenbush ME	13730af	
1900	2000	USA, WHRI Cypress Creek SC	9495sa	9840va
		11785na		
1900	2000	USA, WINB Red Lion PA	13570am	
1900	2000	USA, WRMI Miami FL	9955am	
1900	2000	USA, WTJC Newport NC	9370na	
1900	2000	USA, WWCR Nashville TN	9980na	12160na
		15825na		
1900	2000	USA, WWRB Manchester TN	9385va	
1900	2000	USA, WYFR/Family Radio Worldwide	13615am	
		13690af 17795na 17845af	18930eu	
		18980eu		
1900	2000	Zambia CVC/ The Voice Africa	4965af	9420af
1905	1910	Sat Croatia, Voice of Croatia	6165eu	
1905	1915	mtwhf Croatia, Voice of Croatia	6165eu	
1905	2000	Mon South Africa, SA Radio League	3215af	

1930	1958	Serbia, Intl Radio Serbia	6100eu	7200eu
1930	2000	fas Germany, Pan American BC	9515af	
1930	2000	Iran, VOIRI/IRIB	5945eu	6205eu
		9800af 9925af		
1930	2000	Slovakia, R Slovakia International	5915eu	
		7345eu		
1930	2000	Turkey, Voice of Turkey	6050eu	
1936	1950	New Zealand, Radio NZ International	11725pa	
1945	2000	mtwhf Albania, Radio Tirana	7465eu	11645na
1945	2000	mtwhf UK, Bible Voice Broadcasting	11830af	
1951	2000	DRM New Zealand, Radio NZ International	9890pa	
1951	2000	New Zealand, Radio NZ International	11725pa	

2000 UTC - 4PM EDT / 3PM CDT / 1PM PDT

2000	2005	Mon South Africa, SA Radio League	3215af	
2000	2015	Sun Germany, Pan American BC	9515af	
2000	2015	mtwhf UK, Bible Voice Broadcasting	11830af	
2000	2025	Turkey, Voice of Turkey	6050eu	
2000	2027	China, China Radio International	7160eu	
2000	2030	Egypt, Radio Cairo 9310af	11530af	
2000	2030	fa Germany, Pan American BC	9515af	
2000	2030	Iran, VOIRI/IRIB	5945eu	6205eu
		9800af 9925af		
2000	2030	Swaziland, TWR 3200af		
2000	2030	USA, Voice of America	4930af	4940af
		6080af 11975af	13710af	
2000	2030	Vatican City, Vatican Radio	7365af	9755af
		11625af		
2000	2045	USA, WYFR/Family Radio Worldwide	17750sa	
2000	2050	DRM New Zealand, Radio NZ International	11725pa	
2000	2050	New Zealand, Radio NZ International	9890pa	
2000	2057	China, China Radio International	5960eu	
		5985va 7190eu 7285eu	7295va	
		9440va 9660eu 11640va	13630va	
2000	2057	Netherlands, R Netherlands Worldwide	5905af	
		7425af 11610af		
2000	2100	Anguilla, Worldwide Univ Network	11775am	
2000	2100	Australia, ABC NT Alice Springs	2310do	
		4835do		
2000	2100	Australia, ABC NT Katherine	2485do	
2000	2100	Australia, ABC NT Tennant Creek	2325do	
2000	2100	Sat/Sun Australia, Radio Australia	6080va	7240va
		12080as		
2000	2100	Australia, Radio Australia	9500va	11650as
		11660pa 11880as		
2000	2100	Canada, CFRX Toronto ON	6070na	
2000	2100	Canada, CFVP Calgary AB	6030na	
2000	2100	Canada, CKZN St John's NF	6160na	
2000	2100	Canada, CKZU Vancouver BC	6160na	
2000	2100	Equatorial Guinea, Radio Africa	15190af	
2000	2100	Germany, CVC Intl/Voice Africa	11775af	
2000	2100	Germany, Deutsche Welle	6150af	11795af
		11865af 15205af		
2000	2100	fas Italy, NEXUS/IRRS 7290va		
2000	2100	Kuwait, Radio Kuwait	11990va	
2000	2100	vi Liberia, ELWA 4760do		
2000	2100	Malaysia, RTM/Traxx FM	7295as	
2000	2100	Nigeria, Radio Nigeria/Kaduna	4770do	
2000	2100	Nigeria, Voice of Nigeria/Lagos	15120af	
2000	2100	Palau, T8WH/World Harvest	9930as	
2000	2100	vi Papua New Guinea, R East New Britain	3385do	
2000	2100	vi Papua New Guinea, Wantok R. Light	7325va	
2000	2100	Russia, Voice of Russia	6145eu	7240eu
		7330eu		
2000	2100	vi Rwanda, Radio Rwanda	6055do	
2000	2100	vi South Africa, Channel Africa	3345af	
2000	2100	vi Uganda, UBC Radio	4976do	5026do
2000	2100	UK, BBC World Service	3255af	6190af
		9630af 12095af 15400af		
2000	2100	DRM/ vi UK, BBC World Service	3995eu	
2000	2100	Ukraine, R Ukraine International	5840eu	
2000	2100	USA, American Forces Network	4319usb	
		5446usb 5765usb 6350usb	7811usb	
		10320usb 12133usb 13362usb		
2000	2100	USA, WBCQ Monticello ME	15420am	
2000	2100	smtwhf USA, WBCQ Monticello ME	7415am	
2000	2100	USA, WBOH Newport NC	5920am	
2000	2100	USA, WEWN Vandiver AL	11520me	
2000	2100	Sat/Sun USA, WHRA Greenbush ME	11740af	
2000	2100	mtwhf USA, WHRA Greenbush ME	7520va	
2000	2100	asmtwhf USA, WHRI Cypress Creek SC	9495va	
2000	2100	f USA, WHRI Cypress Creek SC	15665va	
2000	2100	USA, WHRI Cypress Creek SC	9515va	11785na
2000	2100	USA, WINB Red Lion PA	13570am	
2000	2100	USA, WRMI Miami FL	9955am	
2000	2100	USA, WTJC Newport NC	9370na	
2000	2100	USA, WWCR Nashville TN	9980na	12160na

2000	2100	15825na		
2000	2100	USA, WWRB Manchester TN	9385va	
		USA, WYFR/Family Radio Worldwide	13615am	
		17725sa 17795na 17845af	18980eu	
2000	2100	Zambia CVC/ The Voice Africa	4965af	9420af
2030	2045	Thailand, Radio Thailand World Svc	9535eu	
2030	2058	Vietnam, Voice of Vietnam	7220va	7280va
		9550va 9730va		
2030	2100	Cuba, Radio Havana Cuba	11760va	
2030	2100	Romania, R Romania International	9765eu	
		11810eu 11940af	15465af	
2030	2100	Sweden, Radio Sweden	7395va	
2030	2100	USA, Voice of America	4930af	4940af
		6080af 7595as	11975af	13710af
2045	2100	India, All India Radio	7410eu	9445eu
		9910pa 9950eu	11620eu	11715pa
2045	2100	Vatican City, Vatican Radio	9800am	
2050	2100	Vatican City, Vatican Radio	4005eu	5885eu
		7250eu		
2051	2100	New Zealand, Radio NZ International	17675pa	
2051	2200	New Zealand, Radio NZ International	15720pa	
2051	2200	New Zealand, Radio NZ International	15720pa	

2100 UTC - 5PM EDT / 4PM CDT / 2PM PDT

2100	2120	Vatican City, Vatican Radio	4005eu	5885eu
		7250eu		
2100	2127	Czech Rep, Radio Prague	5930eu	9430va
2100	2130	Albania, Radio Tirana	7510eu	9345na
2100	2130	Australia, ABC NT Katherine	2485do	
2100	2130	Australia, ABC NT Tennant Creek	2325do	
2100	2130	Austria, AWR-Europe	11955af	
2100	2130	Canada, CBC NQ SW Service	9625na	
2100	2130	Cuba, Radio Havana Cuba	11760va	
2100	2130	Nigeria, Radio, National Svc/Abuja	7275do	
2100	2130	USA, Voice of America	7595as	
2100	2130	Vatican City, Vatican Radio	9800ca	
2100	2145	USA, WYFR/Family Radio Worldwide	13615am	
		13690na 17795na 18980af		
2100	2157	China, China Radio International	5960eu	
		6135eu 7120eu 7190eu	7205af	
		7225eu 7285eu 7325af	9600eu	
		11640af 13630af		
2100	2200	Angola, Radio Nacional de Angola	7217do	
2100	2200	Anguilla, Worldwide Univ Network	11775am	
2100	2200	Australia, ABC NT Alice Springs	2310do	
		4835do		
2100	2200	Australia, Radio Australia	9500as	9660as
		11650pa 11660pa 11695as	12080as	
		13630as 15515as		
2100	2200	Belarus, Radio Belarus Minsk	7210eu	7255eu
		7390eu		
2100	2200	Bulgaria, Radio Bulgaria	5900eu	7400eu
2100	2200	Canada, CFRX Toronto ON	6070na	
2100	2200	Canada, CFVP Calgary AB	6030na	
2100	2200	Canada, CKZN St John's NF	6160na	
2100	2200	Canada, CKZU Vancouver BC	6160na	
2100	2200	Equatorial Guinea, Radio Africa	15190af	
2100	2200	Germany, Deutsche Welle	9735af	11865af
		15205af		
2100	2200	Germany, Deutsche Welle	3995af	
2100	2200	Guyana, Voice of Guyana	3291do	
2100	2200	India, All India Radio	7410eu	9445eu
		9910pa 9950eu	11620eu	11715pa
2100	2200	Liberia, ELWA	4760do	
2100	2200	Malaysia, RTM/Traxx FM	7295as	
2100	2200	New Zealand, Radio NZ International	17675pa	
2100	2200	Nigeria, Radio Nigeria/Kaduna	4770do	
2100	2200	Nigeria, Voice of Nigeria/Lagos	7255af	
2100	2200	North Korea, Voice of Korea	7570eu	12015eu
2100	2200	Palau, T8WH/World Harvest	9930as	
2100	2200	Papua New Guinea, Wantok R. Light	7325va	
2100	2200	Russia, Voice of Russia	6145eu	7330eu
2100	2200	South Africa, Channel Africa	3345af	
2100	2200	Syria, Radio Damascus	9330eu	
2100	2200	UK, BBC World Service	3255af	3915as
		5965as 5975as	6005af	6110af
		6190af 6195as	7445af	15400af
2100	2200	UK, BBC World Service	3995eu	
2100	2200	USA, American Forces Network	4319usb	
		5446usb 5765usb	6350usb	7811usb
		10320usb 12133usb	13362usb	
2100	2200	USA, Voice of America	6080af	15580af
2100	2200	USA, WBCQ Monticello ME	15420am	
2100	2200	USA, WBCQ Monticello ME	7415am	
2100	2200	USA, WBOH Newport NC	5920am	
2100	2200	USA, WEWN Vandiver AL	11520me	
2100	2200	USA, WHRA Greenbush ME	7520af	

2100	2200	USA, WHRI Cypress Creek SC	7315sa	9525va
		11785na		
2100	2200	USA, WINB Red Lion PA	9265am	
2100	2200	USA, WRMI Miami FL	9955am	
2100	2200	USA, WTJC Newport NC	9370na	
2100	2200	USA, WWCN Nashville TN	7465na	9980na
		12160na		
2100	2200	USA, WWRB Manchester TN	9385va	
2100	2200	USA, WYFR/Family Radio Worldwide	17845na	
2100	2200	Zambia CVC/ The Voice Africa	4965af	9420af
2115	2200	Egypt, Radio Cairo	6255eu	
2130	2157	China, China Radio International	7325eu	7160eu
2130	2200	Australia, ABC NT Katherine	5025do	
2130	2200	Australia, ABC NT Tennant Creek	4910do	
2130	2200	Canada, CBC NQ SW Service	9625na	
2130	2200	Guam, KSDA/ AWR	11850as	
2130	2200	Lithuania, Mighty KBC Radio	6055eu	
2130	2200	Sweden, Radio Sweden	7395va	
2130	2200	Turkey, Voice of Turkey	7180va	
2130	2200	USA, Voice of America	7405as	

2200 UTC - 6PM EDT / 5PM CDT / 3PM PDT

2200	2100	Sat/Sun	Spain, Radio Exterior Espana	6125eu	
2200	2220		Japan, NHK World Radio Japan		13640pa
2200	2225		Turkey, Voice of Turkey	7180va	
2200	2228		Lithuania, Mighty KBC Radio	6055eu	
2200	2228		Serbia, Intl Radio Serbia	6100eu	7200eu
2200	2230		India, All India Radio	7410eu	9445eu
			9910pa 9950eu	11620eu	11715pa
2200	2230		South Korea, KBS World Radio	3955eu	
2200	2230	w	USA, WBCQ Monticello ME	15420am	
2200	2235		New Zealand, Radio NZ International	17675pa	
2200	2235	DRM	New Zealand, Radio NZ International	15720pa	
2200	2245		Egypt, Radio Cairo	6255eu	
2200	2245		USA, WYFR/Family Radio Worldwide	15770af	
			17845va		
2200	2257		China, China Radio International	5915as	
			7170eu		
2200	2259	DRM	Canada, R Canada International	9800na	
2200	2300		Anguilla, Worldwide Univ Network	6090am	
2200	2300		Australia, ABC NT Alice Springs	2310do	
			4835do		
2200	2300		Australia, ABC NT Katherine	5025do	
2200	2300		Australia, ABC NT Tennant Creek	4910do	
2200	2300		Australia, HCJB Global	15525as	
2200	2300		Australia, Radio Australia	12010va	13630pa
			15230va 15240pa	15515as	17785pa
			17795va		
2200	2300		Belarus, Radio Belarus Minsk	7210eu	7255eu
			7390eu		
2200	2300	smtwhf	Canada, CBC NQ SW Service	9625na	
2200	2300		Canada, CFRX Toronto ON	6070na	
2200	2300		Canada, CFVP Calgary AB	6030na	
2200	2300		Canada, CKZN St John's NF	6160na	
2200	2300		Canada, CKZU Vancouver BC	6160na	
2200	2300		Equatorial Guinea, Radio Africa	15190af	
2200	2300		Guyana, Voice of Guyana	3291do	
2200	2300	vl	Liberia, ELWA	4760do	
2200	2300		Malaysia, RTM/Traxx FM	7295as	
2200	2300		Nigeria, Radio Nigeria/Kaduna	4770do	
2200	2300		Nigeria, Voice of Nigeria/Lagos	7255af	
2200	2300	vl	Papua New Guinea, Wantok R. Light	7325va	
2200	2300		Romania, R Romania International	7440eu	
			9675eu 9790af	11940af	
2200	2300		UK, BBC World Service	5955as	5965as
			6110af 6135as	6155af	6195as
			9740as 15400af		
2200	2300		Ukraine, R Ukraine International	5830eu	
2200	2300		USA, American Forces Network	4319usb	
			5446usb 5765usb	6350usb	7811usb
			10320usb 12133usb	13362usb	
2200	2300		USA, Voice of America	5910va	6105va
			7220va 7405as	7425va	7480va
			9490va 11610va		
2200	2300	fs	USA, WBCQ Monticello ME	7415am	
2200	2300		USA, WBOH Newport NC	5920am	
2200	2300		USA, WEWN Vandiver AL	11520me	
2200	2300		USA, WHRA Greenbush ME	7520af	
2200	2300		USA, WHRI Cypress Creek SC	9615na	11785na
2200	2300		USA, WINB Red Lion PA	9265am	
2200	2300		USA, WRMI Miami FL	9955am	
2200	2300		USA, WTJC Newport NC	9370na	
2200	2300		USA, WWCN Nashville TN	5070na	7465na
			9980na		
2200	2300		USA, WWRB Manchester TN	9385na	
2200	2300		USA, WYFR/Family Radio Worldwide	5950na	

		11740af	15440na	
2200	2300	Zambia CVC/ The Voice Africa	4965af	
2230	2245	Moldova, Radio PMR/Pridnestrovie	6240na	
2230	2257	Czech Rep, Radio Prague	5930na	9435af
2230	2300	Guam, KSDA/ AWR	15320as	
2230	2300	USA, Voice of America	7230va	9780va
		15445va		
2236	2300	New Zealand, Radio NZ International	15720pa	
2236	2300	DRM New Zealand, Radio NZ International	17675pa	
2245	2300	India, All India Radio	9705eu	9950as
		11620as	11645as	13605as

2300 UTC - 7PM EDT / 6PM CDT / 4PM PDT

2300	0000	Anguilla, Worldwide Univ Network	6090am	
2300	0000	Australia, ABC NT Alice Springs	2310do	
		4835do		
2300	0000	Australia, ABC NT Katherine	5025do	
2300	0000	Australia, ABC NT Tennant Creek	4910do	
2300	0000	Australia, HCJB Global	15525as	
2300	0000	Bulgaria, Radio Bulgaria	9700na	11700na
2300	0000	Canada, CBC NQ SW Service	9625na	
2300	0000	Canada, CFRX Toronto ON	6070na	
2300	0000	Canada, CFVP Calgary AB	6030na	
2300	0000	Canada, CKZN St John's NF	6160na	
2300	0000	Canada, CKZU Vancouver BC	6160na	
2300	0000	DRM China, China Radio International	9800ca	
2300	0000	China, China Radio International	5990sa	
		6020na	6040na	9570na
2300	0000	Cuba, Radio Havana Cuba	9550sa	
2300	0000	Egypt, Radio Cairo	6850na	
2300	0000	Guyana, Voice of Guyana	3291do	
2300	0000	India, All India Radio	9705eu	9950as
		11620as	11645as	13605as
2300	0000	Malaysia, RTM/Traxx FM	7295as	
2300	0000	New Zealand, Radio NZ International	15720pa	
2300	0000	DRM New Zealand, Radio NZ International	17675pa	
2300	0000	Papua New Guinea, Wantok R. Light	7325va	
2300	0000	UK, BBC World Service	3915as	5955as
		5965as	6000as	6135as
		9570as	9740as	11955as
2300	0000	USA, American Forces Network	4319usb	
		5446usb	5765usb	6350usb
		10320usb	12133usb	7811usb
2300	0000	USA, Voice of America	6105va	7220va
		7265va	7405va	9490va
		11610va		
2300	0000	fas USA, WBCQ Monticello ME	7415am	
2300	0000	USA, WBOH Newport NC	5920am	
2300	0000	USA, WEWN Vandiver AL	11520me	
2300	0000	USA, WHRA Greenbush ME	5850eu	
2300	0000	USA, WHRI Cypress Creek SC	7315sa	5875na
		7335na	9615na	
2300	0000	USA, WRMI Miami FL	9955am	
2300	0000	USA, WTJC Newport NC	9370na	
2300	0000	USA, WWCR Nashville TN	5070na	7465na
		9980na		
2300	0000	USA, WWRB Manchester TN	5050na	5745va
		6890va	9385va	
2300	0000	USA, WYFR/Family Radio Worldwide	5950na	
		15255as	15440na	17750eu
2300	0000	Zambia CVC/ The Voice Africa	4965af	
2300	2305	vi Liberia, ELWA	4760do	
2300	2315	Nigeria, Radio Nigeria/Kaduna	4770do	
2300	2330	Australia, Radio Australia	9660as	12010pa
		12080pa	13690pa	15230va
		17785va	17795va	
2300	2330	USA, Voice of America	6180va	7460va
		11840va		
2300	2345	USA, WYFR/Family Radio Worldwide	11740am	
2300	2345	DRM Vatican City, Vatican Radio	7370am	
2300	2355	Turkey, Voice of Turkey	5960va	
2300	2357	China, China Radio International	5915as	
		6145as	7180as	7350eu
		11790as		
2305	0000	Canada, R Canada International	9755na	
2315	2330	Croatia, Voice of Croatia	3985eu	7375sa
2300	2330	mtwhf Moldova, Radio PMR/Pridnestrovie	6240na	
2330	0000	Australia, Radio Australia	9660as	12010as
		12080as	13690as	15415as
		17750va	17795va	
2330	0000	UK, BBC World Service	6170as	
2330	0000	USA, Voice of America	6180va	7460va
		11655va	11840va	13640va
2330	0000	m USA, WBCQ Monticello ME	7415am	
2330	2357	Czech Rep, Radio Prague	5930na	7345na
2330	2358	Vietnam, Voice of Vietnam	9840as	12020as

MT ENGLISH LANGUAGE SHORTWAVE STATION RESOURCE GUIDE

Albania, Radio Tirana	http://rtsh.sil.at/
Angola, Radio Nacional de Angola	www.rna.ao/
Anguilla, Worldwide Univ Network	www.worldwideuniversitynetwork.com/
Argentina, RAE	www.radiocnacional.gov.ar/rae/rae.asp
Australia, ABC NT Alice Springs	www.abc.net.au/radio/
Australia, ABC NT Katherine	www.abc.net.au/radio/
Australia, ABC NT Tennant Creek	www.abc.net.au/radio/
Australia, CVC International	www.christianvision.com/
Australia, HCJB Global	www.hcjb.org/
Australia, Radio Australia	www.abc.net.au/ra/
Austria, AWR Europe	www.awr2.org/
Austria, Radio Austria Intl	http://oe1.orf.at/service/international
Bahrain, Radio Bahrain	www.radiobahrain.net/
Bangladesh, Bangla Betar	www.betar.org.bd/
Belarus, Radio	www.radiobelarus.tv.by/eng/
Bhutan, BBS	www.bbs.com.bt/
Bulgaria, Radio	www.bnr.bg/
Canada, CBC NQ SW Service	www.cbc.ca/north/
Canada, Radio Canada Intl	www.rcinet.ca/
China, China Radio Intl	www.cri.cn/
Costa Rica, Worldwide Univ Network	www.worldwideuniversitynetwork.com/
Croatia, Croatian Radio	www.hrt.hr/
Cuba, Radio Havana	www.radiohrcu/
Czech Rep, Radio Prague	www.radio.cz/en/
Finland, Overcomer Ministries	www.overcomerministries.org
France, Radio France Intl	http://rfienglish.com
Germany, AWR Europe	www.awr2.org/
Germany, CVC Intl/Voice Africa	www.christianvision.com/
Germany, Deutsche Welle	www.dw-world.de/
Germany, Overcomer Ministries	www.overcomerministry.org/
Germany, Pan American BC	www.radiopan.com/
Germany, The Overcomer Ministries	www.overcomerministry.org/
Germany, TWR Europe	www.twr.org/
Greece, Voice of Greece	www.voiceofgreece.gr/
Guam, AWR/KSDA	www.awr2.org/
Guam, TWR/KTWR	www.twr.org/
Guyana, Voice of	http://voiceofguyana.com/
India, All India Radio	www.allindiaradio.org/
Indonesia, Voice of Indonesia	www.vri-online.com/
Iran, Voice of the Islamic Rep of Iran	www.2.irib.ir/worldservice/
Italy, IRRS	www.nexus.org
Japan, NHK World/Radio Japan	www.nhk.or.jp/english/
Jordan, Radio	www.jrtvjo.rj/index.php
Latvia, Radio SWH	www.radioswh.lv/index.php
Liberia, ELWA	www.elwaministries.org/
Liberia, Star Radio	www.radioswh.lv/index.php
Libya, Voice of Africa	www.ljbc.net/home.php
Lithuania, Radio Vilnius	www.lrt.lt/
Malaysia, RTM/Traxx FM	www.traxxfm.net/index.php
Malaysia, RTM/Voice of Malaysia	http://202.190.233.9/vom/utama.htm
Monaco, TWR Europe	www.twr.org/
Nepal, Radio Nepal	www.radionepal.org/
Netherlands, Radio Netherlands	www.radioneetherlands.nl/
New Zealand, Radio NZ Intl	www.rnz.com
Nigeria, Radio, Natl Svc/Abuja	http://radionigeriaonline.com
Nigeria, Radio/Kaduna	http://radionigeriaonline.com
Nigeria, Voice of/ Ext. Svc Lagos	www.voiceofnigeria.org
Oman, Radio Oman	www.oman-tv.gov.om
Pakistan, Radio	www.radio.gov.pk
Papua New Guinea, NBC	www.nbc.com.pg/
Papua New Guinea, Wantok R. Light	http://wantokradio.net/
Philippines, Radio Pilipinas	www.radiopilipinas.com/
Poland, Polish Radio	www.polskieradio.pl/zagranica/gb/
Romania, Radio Romania Intl	www.rri.ro/
Russia, Voice of Russia	www.vor.ru/world.html
Saudi Arabia, BSKSA	www.saudiradio.net/
Slovakia, Radio Slovakia Int	www.rsi.sk
Solomon Islands, SIBC	www.sibconline.com.sb/
South Africa, AWR Africa	www.awr2.org/
South Africa, Channel Africa	www.channelafrica.org
South Africa, Trans World Radio	www.twr.org/
South Korea, KBS World Radio	http://rki.kbs.co.kr/english/
Spain, Radio Exterior Espana	www.ree.rne.es/
Sri Lanka, SLBC	www.slbc.lk
Swaziland, Trans World Radio	www.twr.org/
Sweden, Radio	www.sr.se/rs/english/
Syria, Radio Damascus	www.rtv.gov.sy/
Taiwan, Radio Taiwan Intl	http://english.rti.org.tw/
Thailand, Radio	www.hsk9.com/
Turkey, Voice of	www.trt.net.tr
UK, BBC World Service	www.bbc.co.uk/worldservice/
UK, Bible Voice BC	www.biblevoice.org/
UK, FEBA	www.feba.org.uk
UK, Sudan Radio Service	www.sudanradio.org/
Ukraine, Radio Ukraine Intl	www.nrcu.gov.ua/
USA, American Forces Radio	http://myafn.dodmedia.osd.mil/
USA, KNLS Anchor Point AK	www.knls.org/
USA, KTBN Salt Lake City UT	www.tbn.org/
USA, KWHR Naalehu HI	www.whr.org/
USA, Voice of America	www.voanews.com/
USA, WBCQ Monticello ME	www.wbcq.com/
USA, WBOH Newport NC	www.wbfnradio.com/
USA, WEWN Vandiver AL	www.ewtn.com
USA, WHRA Greenbush ME	www.whr.org/
USA, WHRI Cypress Creek SC	www.whr.org/
USA, WINB Red Lion PA	www.winb.com/
USA, WRMI Miami FL	www.wrmi.net/
USA, WTJC Newport NC	www.wbfnradio.com/
USA, WWCR Nashville TN	www.wwcr.com
USA, WWRB Manchester TN	www.wwrb.org/
USA, WYFR/Family Radio Worldwide	www.worldwide.familyradio.org
Uzbekistan, CVC International	www.christianvision.com/
Vatican City, Vatican Radio	www.vaticanradio.org
Vietnam, Voice of Vietnam	www.vov.org.vn
Yemen, Rep of Yemen Radio	www.yemenradio.net
Zambia, CVC Intl/Christian Voice	www.christianvision.com/

Milcom Frequency Profile – Fort Benning and Associated Camps

Another trunk radio system has been activated by the Department of Defense in the 380-400 MHz LMR sub-band. The latest trunk radio system (TRS) is being installed at Camp Frank D. Merrill in the mountains of northern Georgia. Camp Merrill is located 12 miles northwest of Dahlonega, Georgia.

Using the Pro96Com and Unitrunker software packages, the system ID and WACN observed on the three sites noted so far indicates that they are part of the Fort Benning 380-400 MHz trunk radio system.

Based on monitoring last year from the Fort Benning area and what we have seen from our monitoring post, below is a profile of the new 380-400 MHz Fort Benning/Camp Merrill trunk radio system.

System: Project 25 Standard
System ID: 01e WACN: 90b20

Frequencies:

Site 101 386.0750/396.0750c
386.2250/396.2250c 388.0000/398.000c [Fort Benning]
Site 201 386.1375/396.1375c
386.2875/396.2875c 386.4375/396.4375
386.5875/396.5875 386.7375/396.7375
386.9500/396.9500c 388.1125/398.1125
388.2625/398.2625 388.4125/398.4125
388.5625/398.5625 [Fort Benning]
Site 301 386.8250/396.8250
388.2500/398.2500c 388.4000/398.4000c
388.5500/398.5500 388.7000/398.7000c
388.8500/398.8500c 389.4875/398.4875 [Fort Benning]
Site 808 388.0250/398.0250c
388.3250/398.3250c [Camp Merrill] (NAC: 026)
Site 909 386.3750/396.3750
386.8500/396.8500c 388.1750/398.1750c
389.1000/399.1000 [Camp Merrill] (NAC: 027)
Site 1010 386.4000/396.4000vp
388.0000/398.0000c 388.2500/398.2500vp
388.7000/398.7000c [Camp Merrill] (NAC: 028)

Talkgroups:

1050 Unknown user/usage
1053 Unknown user/usage
1056 Unknown user/usage
1057 Fort Benning Foxtrot Base
1060 Fort Benning Rock Force Base
3001 Camp Merrill Radio Techs
3002 Camp Merrill Radio Techs
3202 Fort Benning Military Police Dispatch
3205 Unknown user/usage
3208 Fort Benning Military Police Checkpoints
3217 Fort Benning Sniper School
3220 Unknown user/usage
3216 Fort Benning Sniper School
3217 Fort Benning Sniper School
3222 Unknown user/usage
3224 Unknown user/usage
3225 Unknown user/usage
3227 Unknown user/usage
3247 Unknown user/usage
3248 Unknown user/usage
3249 Unknown user/usage
3251 Unknown user/usage
3253 Fort Benning Rock Steady Base

3254 Fort Benning Comanche calling any station this net / Comanche calling Guardian 6
3255 Fort Benning Bayonet Battalion Net
3257 Fort Benning Charlie Sierra calling Patriot Sierra / Charlie 2 calling Rock Force Sierra
3260 Fort Benning Charlie 4 calling Rock Force Sierra
3261 Fort Benning Patriot Base
3272 Fort Benning Wildlife/Forestry Management
3282 Fort Benning Scorpion Elements
3304 Admin [Tentative]
3327 Fort Benning Squad leaders? calling TOC
3335 Fort Benning Dragon Elements
3345 Fort Benning Fryar Drop Zone
3346 Fort Benning Fryar Drop Zone
3442 Fort Benning Fire Department Dispatch
3443 Fort Benning Fire Department Base
3453 Lawson AAF Operations
3456 Fort Benning EMS Operations
3465 Martin Army Community Hospital Emergency Room
3476 Unknown user/usage
3482 Unknown user/usage
3516 Fort Benning Transportation/Buses "Kingpin Base"
3517 Fort Benning Transportation
3534 Panther Sierra
3535 Fort Benning Diablo Elements
3541 Bulldog Main
3568 Fort Benning Range Control
3569 Fort Benning Range Control Supplies
3636 Fort Benning Ammunition Stock Control
3648 Fort Benning Bulldog Elements
3658 Admin [Tentative]
3701 Fort Benning E-911
3702 Fort Benning Range Control – Lifenet/EMS
3703 Fort Benning Range Control <Primary>
3704 Unknown user/usage
3705 Unknown user/usage
3708 Fort Benning R-3002 Range Control "Skywatch"

Camp Merrill's 406-420 MHz EDACS system is still in use, for the time being. Here are the latest details of that system and the Fort Benning EDACS system that I recently monitored.

System: EDACS 96 Wide

Frequencies:
Fort Benning Site 001 406.5500 (LCN1) 407.3500 (LCN2) 408.1500 (LCN3) 408.9500 (LCN4) 409.7500 (LCN5) 406.2250 (LCN6) 406.7500 (LCN7) 408.3500 (LCN8) 409.0500 (LCN9) 409.1500 (LCN10)
Black Mountain Site 002 407.2250 (LCN1) 407.5250 (LCN2) 408.0500 (LCN3)
Brawley Mountain Site 003 407.2500 (LCN1) 407.3750 (LCN2) 407.5750 (LCN3)

Note: The Brawley Mtn site uses the CW ID "Brawley."

Talkgroups:

00-006 Camp Merrill Unknown user/usage
03-043 Camp Merrill Unknown user/usage
04-144 Fort Benning Cable
05-112 Fort Benning Firefox Base
08-035 Fort Benning E-911 Operations – Public Safety Interagency
08-055 Fort Benning Range Control
08-055 Camp Merrill Possible Range Control or MP TG
08-100 Unknown user/usage
08-101 Fort Benning Military Police Dispatch
08-102 Fort Benning Military Police Patrol Tactical
08-103 Fort Benning Military Police Administration
08-104 Fort Benning Military Police Administration Command

08-106 Fort Benning Military Police Investigators
08-110 Fort Benning Search and Rescue Team
08-111 Fort Benning Check Point Operations
08-112 Unknown user/usage
08-113 Fort Benning Traffic Car-to-Car
08-114 Fort Benning K-9 Dog Handlers
08-124 Unknown user/usage
08-125 Fort Benning Pioneer Base
08-127 Fort Benning Striker Operations
08-130 Fort Benning Bulldog Operations
08-131 Fort Benning Payton Range Control
08-132 Fort Benning Bradley Base
08-134 Fort Benning Wagon Base
08-135 Fort Benning Bradley CQ
09-043 Fort Benning Rock Steady Base
09-045 Fort Benning Bayonet Base
09-046 Fort Benning Melfort Base
09-047 Fort Benning Patriot Base
09-050 Fort Benning Rehab Base
09-051 Fort Benning Strike Hard Base
09-054 Fort Benning Rock Support Base
09-065 Fort Benning MR Base
09-067 Fort Benning CP Sand Hill Water
09-070 Fort Benning Forestry
09-081 Fort Benning Romeo Base
09-092 Fort Benning Bravo Talk
09-095 Fort Benning Eagle Base
09-142 Fort Benning Charlie Talk
09-143 Fort Benning Alpha Talk
09-144 Fort Benning Bravo Operations
09-145 Fort Benning Ammo Operations
09-152 Fort Benning Staff Duty
09-153 Fort Benning Recovery Operations
09-154 Fort Benning Jump Operations
09-157 Fort Benning Rampage Base
10-041 Fort Benning Hammer Base
10-046 Fort Benning Dragon Base
10-047 Fort Benning Battle Base
10-051 Fort Benning Bull Base
10-054 Fort Benning Blackjack Base
10-061 Fort Benning Net Control
10-142 Fort Benning Fire Dispatch
10-151 Fort Benning Hazardous Materials Tactical
11-002 Fort Benning EMS/Ambulance Dispatch
11-011 Fort Benning Ambulance to Martin Army Community Hospital
11-063 Fort Benning Transportation/Buses – Kingpin Base
11-072 Fort Benning Malone Base
11-081 Fort Benning Cold Steel Base
11-083 Fort Benning 3rd Infantry Division Brigade – Marne Base
11-084 Fort Benning Raider Base
11-085 Fort Benning Tiger Base
11-123 Fort Benning Simpson Range Control
11-127 Fort Benning Transportation Operations
12-043 Fort Benning Red Base
12-046 Fort Benning Echo Base
12-063 Fort Benning Ruth Range Control
12-092 Fort Benning Bushmaster Base
13-141 Fort Benning Stock Control
15-121 Lawson AAF Crash Crew Dispatch
15-122 Lawson AAF Crash Crew Tactical
15-141 Camp Merrill Battalion (RID: 3077 - Possible Romeo c/s)
15-142 Camp Merrill 5th Ranger HHC Company Units: Mountain Ranger 08/09, 41, A41, MP18, MT11, Training Medical Center (TMC)
15-143 Fort Benning CP Darby Talk
15-143 Camp Merrill Alpha Ranger Company Units: A1, A1W, A2J, A2N, 2B, 35
15-144 Camp Merrill Bravo Ranger Company Units: Bravo Base (BB?), B1, B1S
15-145 Fort Benning Alpha Tactical
15-145 Camp Merrill Charlie Ranger Company Units: C1A, C1B, C1H, C1M, C2A

15-146 Fort Benning Bravo Tactical
 15-147 Fort Benning Charlie Tactical
 15-150 Fort Benning Airborne Operations
 15-153 Fort Benning Operations 4
 15-153 Camp Merrill Ranger Operations
 15-154 Camp Merrill Ranger Medical & Instructor TG
 15-156 Fort Benning Sky Watch Range Advisory for R-3002
 15-157 Fort Benning 498th Medical Evacuation Helicopter Unit
 15-157 Camp Merrill Possible 498th Medical Evacuation Helicopter Unit (RID: 3077/15602)

It has been almost a year since I have had a chance to monitor communications in and around Fort Benning. So if you are within range of that fort and have trunking capability, I would certainly appreciate an update on the current radio scene.

Before we move on to other subjects, here is the latest list of aeronautical related frequencies for Fort Benning, Camp Merrill and Camp Rudder in Florida.

Fort Benning/Lawson AAF (KLSF)

Atlanta Approach Control (001-150 deg)
 126.550/353.750
 Atlanta Approach Control (151-240 deg)
 126.025/285.525
 Atlanta Approach Control (241-360 deg)
 125.500/323.100
 Atlanta Approach Control VFR 121.000/287.500
 Atlanta ARTCC (vicinity of Gainesville GA)
 134.800/307.900
 Columbus Metro (GA) ATIS 127.750
 Columbus Metro (GA) Tower 120.100/257.800
 Doughboy Primary 227.400
 Flight Watch - FSS 122.000
 LSF ATIS/Metro 134.375/343.200
 LSF Base Operations 134.100/245.700,
 128.150/372.200
 LSF Ground 121.050/254.250
 LSF Raven Int. 141.050/280.500
 LSF Tower 119.050/269.525
 Macon Approach Control (GA) (>5000 ft)
 124.200/279.600
 Macon FSS Radio (Gainesville GA) 122.550
 Macon FSS Radio (Macon GA) 122.200
 R-3002 Range Control "Skywatch"/Air-to-Air
 139.375/249.500
 Range Division Tampa Nester (FM) 38.600

Florida Ranger Camp (Camp Rudder - 6th Ranger Training Battalion)

Auxiliary Field 6 138.100/371.100
 Choctaw Tower/Advisory 126.200/315.600
 Crestview CTAF 122.950
 Eglin Approach Control (North) 125.100/281.450
 Eglin Approach Control (South) 132.100/281.450
 Eglin ATIS 134.625/335.800
 Eglin Base Operations 122.850/377.200
 Eglin Clearance Delivery 127.700/273.500
 Eglin Ground 121.800/353.650
 Eglin Mission Control 135.250/315.000
 and 262.300
 Eglin Tower 118.200/360.600
 EMT/Fire Department 123.600
 Hurlburt Tower 126.500/291.100
 Metro 342.500
 6th RTB "Noble Hamlet" (FM) 51.000
 ROCC 126.250

Unit Frequencies

408th Medevac Int. (FM) 49.650
 Pathfinder 41.000 43.650
 4th Ranger Training Battalion 33.100 44.900

Mountain Ranger Camp (Camp Merrill 5th Ranger Training Battalion)
 122.550
 Macon FSS Radio 139.300/227.200
 Mosby AHF (GA) Air-to-Air 34.100 38.500
 Mountain Range 8 or 38H 73.000

6th Range Training Battalion Callsigns

<Name> ## Goggle Aircraft using Night Vision Device
 72 OPFOR
 72C1 OPFOR for "C" Company, 1st Platoon etc.
 73 RTB PI "runner"
 74 RTB Assistant Primary Instructor

75 RTB Primary Instructor (PI)
 76 RTB Tactical Operations Center (TOC)
 B6 Bravo Company Commander (also, A6, C6, etc.)
 B14 Bravo Company, 1st Platoon Squad Leader Walker
 B15 Bravo Company, 1st Platoon PSG Walker
 B26 Bravo Company, 2nd Platoon Leader etc.
 Dive Team Self-explanatory
 Dust-off MEDEVAC
 Gator 3 S-3 (Training OIC)
 Gator 3N S-3 Air NCOIC
 Gator 5 RTB Executive Officer
 Gator 6 RTB Commander
 Gator 7 RTB CSM
 Gator Air or Gator 3 Air S-3 Air
 Gator Doc Physicians Assistant
 H6 HHC Commander (all backside support: divers, OPFOR, boats)
 MED 1 FLA1 (ground ambulance)
 MED 2 FLA2 (ground ambulance)
 Safety Boat 1 Self-explanatory
 Watertown Base Senior Boat Leader or a C2 boat operator

Aeronautical Frequency Changes

Here are the latest aeronautical frequency changes from the Federal Aviation Administration and Jack NeSmith in central Florida. It should be noted that the clearing out of aeronautical services from certain frequencies in the 380-400 MHz sub-band continues. In a future Milcom column I will do a complete update on the latest bandplan we have uncovered in that band.

119.175 Moncks Corner Berkeley County SC (KMKS) AWOS-3
 119.200 Scott AFB IL (KBLV) Ground Control
 119.875 Scott AFB IL (KBLV) Clearance Delivery
 120.750 Washington ARTCC (ZDC) Whalleyville RCAG NC Ultra High ex-127.425
 120.900 Pueblo Memorial CO (KPUB) Clearance Delivery
 121.050 Cannon AFB NM (KCVS) Approach/Departure Control, ex-125.500
 123.975 Laurens County SC (KLUX) AWOS-3
 124.150 CGAS Cape Cod MA Ground Control
 125.000 Fort Wainwright/Ladd AAF AK (KFBK) Airfield Lighting
 127.475 Cherry Point MCAS NC (KNKT) ATIS ex-124.750
 127.800 Jacksonville ARTCC (ZJX) Approach/Departure service Perry Foley RCAG
 128.625 Jacksonville ARTCC (ZJX) Approach/Departure service Tallahassee RCAG
 128.825 Portsmouth International at Pease Airport NH (KPSM) FBO
 132.400 Anoka County-Blaine Airport (Janes Field) MN (KANE) Tower ex-126.050
 132.450 Miami ARTCC (ZMA) Approach/Departure Services Pahoake RCAG FL
 133.700 Jacksonville ARTCC (ZJX) Valdosta GA RCAG Low Discrete
 135.575 Indianapolis ARTCC (ZID) Portsmouth OH RCAG Low Discrete
 142.350 Fort Wainwright/Ladd AAF AK (KFBK) Airfield Lighting
 227.400 Fort Benning/Lawson AAF GA Doughboy Primary (KLSF), ex-244.600
 239.300 Seattle-Tacoma International WA (KSEA) Tower
 254.425 Barksdale AFB LA (KBAD) PTD ex-254.275 and 372.200
 263.025 Scott AFB IL (KBLV) Clearance Delivery
 275.800 Scott AFB IL (KBLV) Ground Control
 290.225 San Antonio TX Departure Control service, ex-381.400
 290.425 Washington ARTCC (ZDC) Green Bay RCAG VA Low Altitude
 297.000 Eastern WV Regional (Shepherd Field) WV (KMRB) ANG Command Post Ops Galaxy Control (CP)/Pikeside Ops (Base Ops)
 307.100 Miami ARTCC (ZMA) Approach/Departure Services Pahoake RCAG FL

311.000 Cannon AFB NM (KCVS) Command Post Trailboss ex-Raymond 7
 335.625 San Antonio TX Approach Control service, ex-392.100
 343.800 Jacksonville ARTCC (ZJX) Approach/Departure service Tallahassee RCAG
 352.000 Jacksonville ARTCC (ZJX) Approach/Departure service Perry Foley RCAG
 379.225 Phoenix Mesa Gateway AZ (KIWA) Tower (East) ex-255.6
 399.600 Jacksonville ARTCC (ZJX) Valdosta GA RCAG Low Discrete

Flight Service Stations

A Flight Service Station (FSS) is an air traffic facility that provides information and services to aircraft pilots before, during, and after flights, but unlike air traffic control (ATC), is not responsible for giving instructions or clearances or providing separation. The people who communicate with pilots from an FSS are referred to as specialists rather than controllers, although in the U.S., FSS specialists' official job title is air traffic control specialist - station.

The precise services offered by stations vary by country, but typical FSS services may include providing preflight briefings including weather and notices to airmen (NOTAMs); filing, opening, and closing flight plans; monitoring navigational aids (NAVAIDs); collecting and disseminating pilot reports (PIREPs); offering traffic advisories to aircraft on the ground or in flight; relaying instructions or clearances from air traffic control; and providing assistance in an emergency. In many countries, flight service stations also operate at mandatory frequency airports to help co-ordinate traffic in the absence of air traffic controllers, and may take over a control tower frequency at a controlled airport when the tower is closed.

In most cases, it is possible to reach flight service stations either by radio in flight, or by telephone on the ground. Recently, some countries, such as Canada and the United States, have been consolidating flight services into large regional centers, replacing former local flight service stations with remote communications outlets (RCOs) connected to the centers.

Here from the FAA are the latest frequency changes for the Flight Service Stations listed below.

Albuquerque Radio NM	121.500 122.000 122.500 243.000 255.400
Denver Radio CO	121.500 122.000 122.200 122.350 243.000 255.400
Macon Radio GA	121.500 122.000 122.100R 122.200 122.400 243.000 255.400
Oakland Radio CA	121.500 122.000 122.200 122.500 129.400 Enroute 131.950 Extended Range VHF 255.400
San Diego Radio CA	121.500 122.200 122.400 255.400

One final note before I wrap up this edition of *Milcom*. I am looking for a monitor in the panhandle of Florida that can check out the land mobile services at various military installations, such as Tyndall and Eglin. If you have some LMR monitoring experience and can help us with a monitoring project in the areas above, please contact me at the email address in the masthead.

And that does it for this month. Until next time, 73 and good hunting.

Inauguration and Super Bowl Wrap Up

The first two months of 2009 brought us not one, but two National Security Special Events that offered great potential for scanner listeners. Both the Inauguration of the 44th President of the United States, Barack Obama, and the playing of Super Bowl XLIII in Tampa represented a huge mobilization of local, state, federal, and even military hardware and personnel for both events. Since keeping these types of events safe from potential threats is a primary goal of public safety and law enforcement these days, it seemed that no expense was spared to prepare for these potential targets.

In the case of the Presidential Inauguration, the preparation and organization of local and federal agencies was unprecedented. Almost every federal agency or office seemed to have some participation in the inaugural events in some way. Estimates on the number of people expected to pour into the nation's capitol varied up into the millions, so plans to cover every possibility were going to take many people and equipment.

As in past security events such as these, both military Combat Air Patrols and the Customs Air and Marine (CBP A&M) aircraft were busy at both events. You can find the latest news on the CBP A&M division here: www.cbp.gov/xp/cgov/border_security/air_marine/cbp_air_marine_overview.xml

❖ Presidential Inauguration 2009

Unfortunately, I was not able to attend any of the inaugural events in Washington, DC, but with the help of several sources I was able to get a handle on what was heard on some of the federal frequencies during the days of activities. One problem with monitoring in the Washington DC area is trying to figure out what is new and different in the federal bands. Some of the active frequencies that were reported may not have been related to inauguration activities, but many

probably were. It's hard to imagine any federal agency that didn't have something related to the inauguration going on!

Some new sources of active radio traffic related to the inauguration were found on the 380 MHz P-25 UHF trunked systems in the DC Military District. These new P-25 trunked sites have been showing up all around the Washington area like so many dandelions lately. I am looking forward to some aggressive analysis of these new trunked systems in a future trip to the DC area.

As was expected, many of the federal law-enforcement channels were using encryption, but some were not, or were not using it 100% of the time. Even small bits of clear traffic can sometimes reveal some information about the possible user agency, so don't give up on some of those encrypted channels. In the listings below, I did not include any traffic heard on the DC area UHF federal and military trunked systems, as that would take up more room than I have in this column. Channels that have no user information listed did not provide enough information to positively identify them at this time.

N = P-25 Network Access Code
D = DCS Digital Coded Squelch
C = CTCSS Analog Tone Squelch
CSQ = Carrier Squelch

Freq.	Code	User / info
162.0500	N293	
162.0750	N201	Secret Service Uniformed Division
162.1250	N293	
162.2500	173.8	US Capitol Police F4
162.3125	N211	Secret Service uniformed Division
162.6125	C127.3	US Capitol Police F5
162.6125	D031	
163.0250	N4C5	
163.1000	N167	Federal Itinerant, FBI
163.1125	N001	
163.2125	N100	
163.3125	N202	Secret Service Uniformed Division
163.3750	C210.7	US Postal Service
163.6500	N081	DHS Immigration and Customs Enforcement
163.7250	N073	DHS Immigration and Customs Enforcement
163.7750	167.9	FBI, JHAT (Joint Hazard Assessment Team)
163.8875	N167	FBI
163.9375	N167	FBI, possible input to 167.4625 MHz
164.1750	N011	Secret Service Uniformed Division
164.4000	N001	Secret Service PAPA
164.4375	N212	Secret Service Uniformed Division
164.5750	N4C5	Possible input to 170.5125 MHz
164.6750	N075	
164.8875	N001	Secret Service OSCAR
165.1875	C156.7	Arlington National Cemetery
165.2125	N001	Secret Service MIKE

165.2375	C100.0	DHS Customs A&M OMAHA air assets
165.2875	N650	BATFE NET 1
165.3750	N001	Secret Service CHARLIE
165.4125	C210.7	Mall area
165.5375	C146.2	US Capitol Police F2
165.5875	C167.9	FBI Washington Field Office
165.7875	N001	Secret Service BAKER with EV-ERGREEN (Hillary Clinton)
165.9250	C127.3	
165.9750	C127.3	
166.0875	N754	clear; "this side of Mall"
166.3250	N546	
166.4375	C100.0	DHS Customs & Border Protection, input to 165.2375 MHz
166.4625	N001	DHS & Treasury Common
166.5125	N001	WHCA SIERRA
166.7250	C127.3	US Park Police F1
166.9250	C127.3	US Park Police F2
166.8500	C127.3	US Park Police F4
167.0125	N001	Secret Service
167.0375	N001	Secret Service
167.0750	C127.3	US Park Police F3
167.1875	N001	
167.2125		FBI
167.3125		FBI
167.3625		FBI
167.3875		FBI
167.4125	N167	FBI
167.4375	C167.9	FBI
167.4375	C167.9	FBI
167.4625	N167	FBI
167.4875		FBI
167.5375		FBI
167.7875		FBI
167.9500	C167.9	FBI, reported as DC Field Office Intelligence Teams
168.1250	C167.9	
168.1750	N293	
168.2625	N71F	
168.4250	CSQ	"Command Center"; "west lobby 1"; "east lobby 1"
168.4250	N293	National Capital Parks
168.5875	N001	Secret Service
168.8625		
168.8750	N653	DC INTEROP 2, patched with 866.5125 MHz
168.9000		
168.9750	C167.9	FBI
169.2250	C110.9	US Capitol Police F1
169.4500	C100.0	DHS Customs NET
169.5000	C103.5	
169.7750	N4C5	US Parks Service - George Washington Parkway
170.0000	NFFB	Secret Service Washington Field Office
170.1000	C103.5	
170.1750	C156.7	US Capitol Police F3
170.4750	N653	
170.5125	N4C5	US Parks Service
170.7500	N293	US Marshals
170.7875	N001	
170.8000	N098	
171.3625	N293	
172.1500	N001	TSA (DCA)
172.1500	N002	TSA (DCA)
172.4750	N4C5	National Parks Service National Capital Parks - Central
172.5375	N001	
172.5500	NE04	Radio tests
172.5875	N077	
172.7500	C229.1	National Parks Service, reported White House Maintenance
172.9000	N003	TSA (DCA)
172.9125	N293	FAA DCA NAVCOM and POTOMAC SOC



Courtesy of the Secret Service

173.0000	N293	Capitol Police
173.5250	C167.9	
173.5500	N71F	
173.6375	N293	
173.8125	N167	US Supreme Court Security FBI, reported as HRT/TSR operations
260.9000	AM	NORAD
345.0000	AM	DHS Coast Guard air units GUARDIAN
350.0250	AM	CBP Customs A&M units GUARDIAN
350.2500	AM	GUARD DOG
406.5500	C210.7	National Gallery of Art - Security Justice Department - FBI Headquarters
406.6000	C167.9	
406.8625	N312	Disaster Medical Assistance Teams
406.9375	C77.0	Called HAZMAT 3 or OPS 3 US State Department
407.2500	N003	
407.6000	N0F0	US Postal Inspectors
407.6625	N312	
407.7250	N482	US State Department
407.7750	N482	
407.7875	D364	US Capitol
407.8625	N0F0	
408.2625	N312	US State Department-building security FOGHORN
408.2750	C167.9	
408.4000	C167.9	Disaster Medical Assistance Teams
408.5125	D632	
408.6000	N0F0	Federal Interoperability
409.0000	N293	
409.3375	C114.8	US Capitol Police?
409.3750	D606	
409.4000	N265	Government Printing Office
409.5125	D073	
409.5500	C100.0	National Parks Service
409.7125	N0F0	
409.8375	C77.0	US State Department
409.8625	C141.3	
410.4625	N312	US Capitol Police
410.6625	C141.3	
411.1250	N156	FEMA
411.2750	N202	FEMA
414.4750	N203	
415.2000	N201	Drug Enforcement Administration
417.2000	N201	
417.8875	N295	DHS Federal Protective Service
417.9500	C127.2	
419.2500	C167.9	DHS Federal Protective Service
419.4875	D624	

Some observations about some of the frequencies shown above – several previously unidentified VHF frequencies were observed using a NAC of N001. This has become a common NAC used by the Secret Service (and some other agencies). While there wasn't enough clear traffic to identify the user, these frequencies definitely need a second look when the Secret Service is in town. Also, it should be noted that the Uniformed Division of the Secret Service are apparently not using NAC001 on their frequencies in DC.

Special thanks to all the listeners in the Capitol region who shared their findings, but wished to remain anonymous.

❖ Super Bowl XLIII

The 43rd Super Bowl was played in Tampa, Florida, at Raymond James stadium on February 1st. I was on location to help with the international television coverage of the event. The two weeks leading up to the big game were a chance for me to sweep the radio spectrum and see what was going on in the Tampa area.

Where the Secret Service was the lead federal agency at the Presidential Inauguration, the FBI was in the lead in Tampa. Along with the FBI, nearly 20 local, state and federal agencies

were operating at the Tampa Operations Center, or as it was referred to on the radio, TOC. Encryption was used very consistently on many of the monitored P-25 communications, but some clear traffic was heard. But overall, it appeared that radio traffic in general and the number of active frequencies at Super Bowl XLIII was down from past bowls, such as at Phoenix or Miami.

So, here is what was heard in the Tampa area over the two weeks I was based there. Some traffic may not have been directly related to Super Bowl operations, but much of it was:

Freq	Mode/Code	User / comments
119.0500	AM	Tampa airport tower, discrete frequency used over the stadium
136.3750	AM	CBP A&M OMAHA42B with JACKPOT
139.8000	AM	Thunderbirds air-to-air
140.7000	AM	Thunderbirds air-to-air
148.1500	C110.9	Civil Air Patrol repeater
157.0500	CSQ	US Coast Guard Operations
162.0250	CSQ	US Coast Guard Operations
162.1250	CSQ	US Coast Guard Operations
162.1375	P-25	
162.2125	C179.9	
163.0625	P-25	
163.0875	131.8	VAMC Maintenance
163.2375		
163.2625	D464	
163.3625	N131	VAMC Security
163.8625	N167	FBI
164.4375		
164.5500	N780	
164.5500	N167	
164.8250	123.0	
164.9625	100.0	CBP A&M air operations TAC 21
165.0750		
165.2375	100.0	CBP Customs NET 1
165.2875	N650	BATFE NET 1
166.3000	100.0	
166.4625	N167	DHS Common, called CHANNEL 3
167.3750		
167.4375	N167	FBI
167.4625	167.9	FBI
167.4875	N167	FBI
167.5125	N167	FBI
167.5375	N167	FBI
167.5625	167.9	FBI
167.5875	N167	FBI
167.6875	N167	FBI
167.7875	N167	FBI
168.5250	CSQ	Paging – VA Medical Center
168.8250	N167	FBI
168.8500	151.4	DHS CBP Border Patrol
169.4750	CSQ	Data?
170.1250	D371	US Postal Service operations
170.6750		
170.7875	N272	
171.0125		FAA Data
171.0750	100.0	CBP Customs
171.6875	N293	
172.1500	P-25	DHS TSA at Tampa International Airport
172.2125	P-25	
172.8750	N293	FAA at Tampa International Airport
172.9000	N001	DHS TSA at Tampa International Airport
173.0125	N650	BATFE TAC 3
228.9000	AM	CBP A&M OMAHA39 with HUNTRESS (NORAD)
260.9000	AM	OMAHA39 & OMAHA42B with HUNTRESS
345.0000	AM	US Coast Guard JEDDA or JEDDAH
349.0000	AM	Thunderbirds
350.0250	AM	OMAHA42B with JACKPOT
364.2000	AM	NORAD

Unfortunately, I was not able to catch much good stuff in the federal UHF band. Most of the time I was searching while in the stadium area, and there were hundreds of UHF business band radios running around me all the time, so images

and signal overload was a constant problem. However, I was able to get some frequencies logged while at my hotel in Tampa:

Freq	Code	User / comments
406.0250	203.5	
406.1375	D371	US Postal Service - Truck operations
406.5625	N127	MacDill AFB TRS
406.7625	N127	MacDill AFB TRS
406.9625	N127	MacDill AFB TRS
407.1375	N482	US Postal Inspectors
407.3625	N127	MacDill AFB TRS
407.5625	N127	MacDill AFB TRS
407.7625	N127	MacDill AFB TRS
407.9625	N127	MacDill AFB TRS
408.1625	N127	MacDill AFB TRS
408.3625	N127	MacDill AFB TRS
408.5625	N127	MacDill AFB TRS
408.8500	D506	
409.1625	P-25	
409.4750	CSQ	
409.9500	D432	
414.7000	136.5	
415.0500	N482	US Postal Inspectors
415.1375	D371	US Postal Service - input to 406.1375 repeater
416.1735	N482	US Postal Inspectors - input to 407.1375

An interesting side note to the activities at the stadium occurred just prior to the big game. The New York Yankees spring training facility, George Steinbrenner Stadium, is located across the street and was designated as our emergency evacuation area in case of an emergency at the stadium.

On the Friday evening prior to Super Sunday, I heard, but could not see, a large helicopter land at what appeared to be some sort of designated staging area at Steinbrenner Stadium. Early Saturday morning I was able to get a look at what had landed. It turns out there were not one, but two Bell 412 twin-engine, four rotor helicopters – one was a very dark green and the other a dark maroon color. Both were unmarked, except for the N number along the tail boom. Both took some orientation flights around the stadium on Saturday, with some of their personnel hanging their legs out of the open side doors on the aircraft. All appeared to be wearing dark green flight suits or BDU-type uniforms. No radio traffic was identified specifically with these two choppers, but there was some reference to perimeter security around the field they had landed in.

According to Wikipedia, one of the federal agencies operating the Bell 412 helicopter is the US Department of Energy. Could this have been a NEST team on location?

Special thanks go to all those folks listening in Washington DC and Tampa who were kind enough to share what they heard with me – you know who you all are!

That's all for this month and the *Fed Files*. But we will return in July!



Courtesy of the FBI

DXing General Aviation UNICOM

There are many facets to listening to aircraft communications. Here is one that may appeal to some of you – DXing UNICOM transmissions as planes maneuver at or near small airports. The object is to log as many airports as possible that you hear called out by pilots.

At nontowered airports, sometimes known as “uncontrolled airports,” pilots routinely announce their intentions to take off, to land, or to traverse an airport area. These can be heard for over 100 miles from an airport – but the terrain, the listener’s location, the receiving antenna type and height, and an aircraft’s altitude all figure into it.

Let’s take a look!

❖ DXing

When amateur radio operators talk about DXing, they usually mean attempting to contact or actually working distant and hard-to-contact countries on the shortwave amateur bands. Then, too, some hams seriously DX the VHF and UHF ham bands. Most will agree that the listening type of DXing is trying to hear distant and/or hard-to-receive stations.

In the context of this article, it means hearing the planes landing at and departing from small airports which have no control towers and from just as far away as you can hear them – but also logging all the airports found on these frequencies – at any distance. Once you get started, it can be a lot of fun.

❖ Nontowered Airports

“Nontowered airports – those not served by an operating air traffic control (ATC) tower – are much more common than towered fields. In fact, nearly 20,000 airports in the United States are nontowered, compared to approximately 500 that have towers.” This is from an excellent sixteen-page article entitled *Operations at Nontowered Airports* by the Aircraft Owners and Pilots association (AOPA) www.aopa.org/asf/publications/sa08.pdf

This article will help you to understand what the pilots are doing, based on what they announce. Traffic pattern terminology is one of the important elements.

❖ UNICOM

With no control tower, pilots self-announce their intentions on designated UNICOM frequencies and then work out landing and departure sequences with other pilots who are in the airport area by radio. The frequencies shared among nontowered airports are 122.7, 122.725, 122.8, 122.975, 123.0, 123.05, and 123.075 MHz.

The frequency for any given airport can be found at www.airnav.com/airports/. As an example, the AirNav.com listing for Rio Linda Airport – L36 (Northern California) lists CTAF/UNICOM: 123.0, so that is the frequency to monitor for this airport.

The ground-based airport UNICOM op-

erator is not an Air Traffic Controller. He/She can offer advisory information only, like wind direction and altimeter setting, and can answer questions about and help to make arrangements for things like refueling, rental cars, etc. UNICOM stations at nontowered airports are usually manned only part time. It is also not a requirement to contact the UNICOM operator for either landing or departing. Even so, if you do live close enough to an airport, you will hear the ground side at times.

When small public-use airports are not licensed for UNICOM, you may hear aircraft self announce on 122.9, so listen to that one as well.

On some days, in some areas, the frequencies can be so busy that it is best to listen to only one frequency at a time. It can also help to have a recorder running, so calls that were not clear and obvious can be reviewed.

❖ Beyond DXing

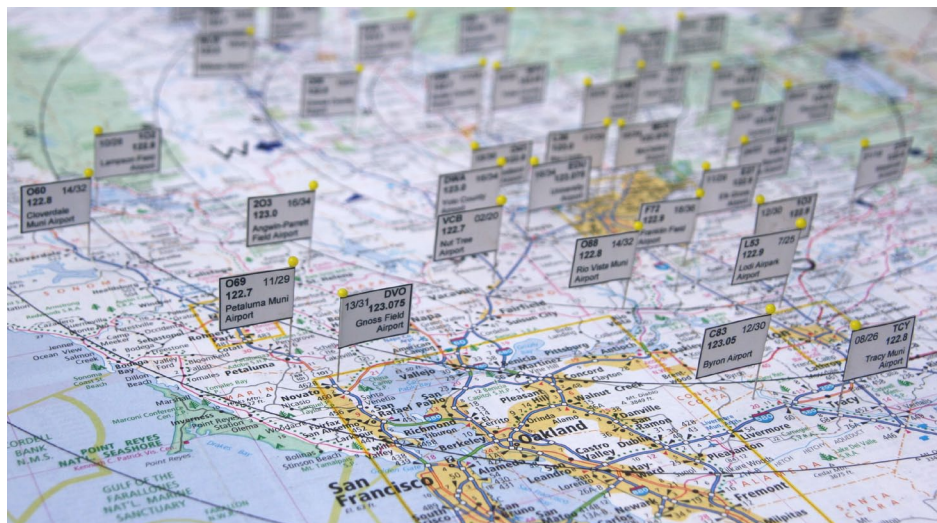
Some airports without a control tower and using UNICOM can have real interesting stuff. The following is part of a single day log for McClellan Airfield on 122.975 near Sacramento, CA www.airnav.com/airport/KMCC - provided by MT reader Bill Truscott.

- CHP AIR-21 (Cessna 206, N521HP) On short final, RWY 16.
- EVERGREEN 2105 HEAVY (747) Advising inbound from Travis AFB.
- Placer County Sheriff Helo FALCON 30 (OH-58, N1851S) Advising inbound.
- Helicopter 3TV (KCRA TV News, N358TV) Transitioning over field.
- Sacramento Police Helicopter AIR-1 (N916PD) Advising inbound.
- SPARTAN 674 (UH-60) Inbound RWY 16.
- TANKER 25 (P-3, N925AU) Inbound for CalFire Ramp.
- Medical Helo CalSTAR 3 (N477CS) Inbound for CalSTAR Ramp.
- Coast Guard 1715 (C-130) Taxiing from CG Ramp to RWY 16.

❖ Antenna

Your antenna plays a big role in the VHF/UHF monitoring hobby. For VHF aircraft, a roof-mounted antenna or at least a ten foot pole and mounted in the clear is desirable.

Antennas like the Scantenna www.grove-ent.com/ANT7.html will work okay, but it is not designed for aircraft reception. The scanner discone like www.grove-ent.com/ANT9.html is a safe bet for both VHF and UHF aircraft listening. A model with the “low band” (30-50 MHz) whip is not required for aircraft listening,



This map shows a portion of the airports around which this column editor has logged UNICOM communications from a single home location using a scanner discone antenna. Each computer-printed, double-sided map flag shows the airport ID, the frequency, the airport name, and its runway numbers.

but your other listening might take advantage of that capability.

If you are into making your own antennas, a quarter wave ground plane cut for about 125 MHz will do well in the VHF aircraft band, but not as well for the other bands.

Despite what some will argue, 75 Ohm RG-6 coaxial cable is fine for scanners. It is economical and has good loss characteristics. F to BNC, F to UHF, and F to N adapters are available for the scanner and antenna ends.

❖ When to listen

Communications may appear at any time on the UNICOM frequencies. The best time to listen, however, is on sunny weekend days, especially after a stretch of bad weather has cleared and pilots are anxious to fly.

❖ What it Sounds Like

Auburn Traffic, this is Cessna Zero One Golf turning base for Zero-Seven, Auburn.

Translation: "Auburn," is for Auburn Municipal Airport (KAUN). The airport name is given at the beginning and end of each announcement to clearly identify that the plane is at or near the Auburn Airport, since there are other airports on the same frequency within reception range. Without such identification, things could get confusing and even dangerous.

The Cessna is only giving a partial ID which is common – and "Golf" is the phonetic representation for the letter "G."

"Zero-Seven" is Runway 07 – meaning that the landing direction, by adding a zero, is 070 degrees clockwise rotation from magnetic north. If a plane were landing or taking off in the opposite direction, it would be 180 degrees reversed, or Runway 25 – spoken "two five" and 250 degrees rotation from north.

"Turning base" is stating that the plane is finishing the "downwind leg" of the landing pattern and beginning the "base leg" of the pattern. Please refer to the AOPA article mentioned above for info and diagrams.

Nut Tree Traffic, Helicopter Eight Niner Golf, five miles out for a straight in approach to Zero-Two, Nut tree.

Translation: "Nut Tree" is Nut Tree Airport (KVCB). "Niner" is nine spoken that way to help make it distinctly nine. "Five miles out for a straight in approach" means he is five miles from touchdown and is already aligned with Runway 02 and not flying the typical landing pattern.

Sutter County Traffic, Centurion Three Niner Kilo, turning final for Three-Five, Sutter County.

Translation: The airport is Sutter County Airport (KO52). He is finishing the "base leg" of the pattern and starting the "final approach leg" with the runway straight ahead and with no further turns needed.

Petaluma Traffic, Coast Guard Two Two Six Zero Sierra, five miles to the south, we'll be entering a left downwind for One-One, Petaluma.

Translation: The airport is Petaluma Municipal Airport (KO69). "...will be entering a left

downwind for One-One" means he will probably join the "downwind leg" of the left hand pattern on a 45 degree angle – and the runway being Runway 11. See the AOPA article for joining the downwind leg.

Orland Traffic, Five Four Bravo, left downwind for Three-Three, Orland.

If you had just logged the above transmissions, you would have five airports on just one of the UNICOM frequencies, 122.7, to put into your collection.

❖ Distance and Direction

It is nice to know how far away each airport is and the direction from one's monitoring location. One approach is to use a suitable road map that includes your listening radius. The map can be cut to suit your needs and attached to a backboard as desired.

Each time you log an airport, you can stick in a map tack or flag, or stick on a small adhesive label with the airport code and frequency on it, or whatever works for you.

On the Rand-McNally state road map image in this article, you will see hand drawn radius circles at twenty mile intervals, plus compass points. This serves to quickly show reception distances and directions. Folded paper maps are often available at gas stations and office supply stores.

Sectional aeronautical charts may be used, too, but it is harder for the non-pilot to get a good, quick grasp of where the airports are with reference to familiar highways and cities.

❖ AirNav.com Radius Search

An AirNav.com radius search for airports can be most helpful in learning about the existence of airports within your listening radius. Go to www.airnav.com/airports and click on "Advanced Search."

At step 1, "Tell us about a nearby place," enter the Lat/Long for your monitoring location. If you don't know that, they offer other options, but the distance and direction results will not be as good as entering your coordinates.

At step 2, "Tell us about the airfields you are looking for," under "Suitable types of fields," check "airports only" and under "Airfield use," check only "Public." This will help to limit search results in areas where there are many airports and is better suited to the pursuit of UNICOM DXing.

At step 3, "Where do you want to search?" select the radius mileages from the pull-down menus. Try "0" and "50" miles first. Also, select "statute miles" unless you relate well to nautical miles. Search results are limited to fifty airports per search. In some cases, a single search will yield all airports within your listening radius. If it doesn't, you may have to search in additional mileage increments.

Keep in mind that the search results will include airports with towers. This is not a bad

201 122.7	06/24	06/24	201 122.7
Quincy			Quincy
Gansner Field			Gansner Field

RIU 122.8	04/22	04/22	RIU 122.8
Rancho			Rancho
Murieta Airport			Murieta Airport

E27 122.9	11/29	11/29	E27 122.9
Elk Grove			Elk Grove
Airport			Airport

DWA 123.0	16/34	16/34	DWA 123.0
Yolo County			Yolo County
Airport			Airport

This is a map flag sample as they are printed before being cut out, folded, and rubber cemented to the pins.

thing, but remember that they won't be operating on the above-listed UNICOM frequencies, the theme of this article.

"088 RIO VISTA, CA 122.8 RIO VISTA MUNICIPAL AIRPORT 78.7 mi SSW" is a typical airport search result. It shows the airport ID, the city, the airport name, and the distance and direction from the search radius center using sixteen compass points.

If you use the map idea above and 78.7 mi SSW, as an example, it is fairly easy to find that airport city or to find the marker you have applied. Look in the SSW direction, just short of the 80 mile circle. The map needs to be used in conjunction with a handwritten or computer-generated airport list / log that includes more details than can be reasonably added to the map.

The far left column of the radius search result has links to individual AirNav.com listed airports. This provides a handy way to get frequencies and info on desired airports in your area.

❖ An Airport is Not Just a Name

As you listen, you will hear airport names you may not have known existed and it can be more enjoyable for some to have a visual image of where the planes are taking off and landing.

For each airport listing at AirNav.com, there will be an aerial photo of the airport. Additionally, each listing includes links to road maps. They are located below the small road map on the right. You might want to try them, zoom in, and switch the aerial / satellite views. Most can be recentered by clicking and dragging.

As a companion to the photo and satellite views, also look at the airport diagram. The link, [Download PDF](#), will be below the Sectional chart.

Time, transportation, and gas money permitting, driving to small airports to watch planes can be enjoyable. Also, some GPS receivers have listings of and directions to airports, even rather small airports. At home after an airport outing, it can be more meaningful when you hear activity on the radio at the airports you have visited. See you next time.

Books by Ernest H. Robl:

THE BASIC RAILFAN BOOK

UNDERSTANDING INTERMODAL

THE POWDER RIVER BASIN

Detailed descriptions at

<http://www.robl.w1.com>

LORAN-C Going QRT

For years, longwave listeners have had to deal with “interference” from the powerful LORAN-C network on 100 kHz. The clickety-clack sounds of LORAN are typically heard 20 kHz above and below this assigned frequency – perhaps much more if you live close to a transmitting station.

While the land-based system has served an important role for decades, it has been largely outmoded by today’s Global Positioning System (GPS). It has been kept operational in recent years mainly as a backup to GPS. Now, under economic pressure, the U.S. Coast Guard has decided to shut down the network after the end of fiscal year 2009. The *ARRL Letter* reported the shutdown in Volume 28, No. 10. Two excerpts from this article follow:

“Last month, the US Coast Guard announced that due to economic conditions, they would be closing down the 24 LORAN-C (Long Range Aid to Navigation) stations operated under the auspices of the USCG. LORAN stations provide navigation, location and timing services for both civil and military air, land and marine users. According to the USCG, LORAN-C is approved as an en route supplemental air navigation system for both Instrument Flight Rule (IFR) and Visual Flight Rule (VFR) operations. The LORAN-C system serves the 48 continental states, their coastal areas and parts of Alaska.

“According to the Coast Guard, the nation’s oldest continuous sea-going service will continue to operate the current LORAN-C system through the end of fiscal year 2009; it is in the process of preparing detailed plans for implementing the fiscal year 2010 budget. According to USCG Vice Commandant and Chief Operating Officer Vice Admiral V. S. Crea, further details of the LORAN-C termination plan will be available upon the submission of the President’s full budget. –Some information provided by Cliff Appel, W7CGA”

Most longwave listeners will be pleased with this news, because it means no more pulsed interference around 100 kHz, and no more overloading of receiver front ends and active antennas. As annoying as the interference from LORAN can be, I feel the system deserves recognition as a long-running, automated navigation service on longwave. Interested readers may enjoy these informative sites on LORAN operation: www.uscg.mil/history/STATIONS/loran_index.asp and <http://en.wikipedia.org/wiki/LORAN>.

❖ WRC-11 Agenda Set

Also from Volume 28, No. 10 of *ARRL Letter*, comes news of the upcoming World Radio-communication Conference (WRC-11) scheduled

for fall 2011. Of most interest to amateurs is agenda item 1.23, “to consider an allocation of about 15 kHz in parts of the band 415-526.5 kHz to the amateur service on a secondary basis, taking into account the need to protect existing services.”

Could this finally bring us a ham band in the vicinity of 500 kHz? Only time will tell. Certainly, the results of recent experimental operation near 500 kHz will be looked at when determining the compatibility of amateur operations with other services. Hams have a good record of co-existing with other users, and this will work in their favor. The possible allocation is a top priority for ARRL staff who will attend the conference.

❖ PC Reception

In the February issue that I reported on a computer program you can download to receive VLF signals using your PC’s soundcard. I have now learned of an even easier way to tune the band (albeit remotely from your location) from Steve Sykes in Victor, NY. He told me about the LF Websdr (software-defined receiver) available at <http://websdr.pa3weg.nl/>. This receiver is located in the Netherlands.

This remarkable website allows you to select the frequency, mode and other parameters of the receiver and listen in with just your PC. I tried it, and was immediately able to hear the beeps from the Russian Alpha system at 12 kHz!

For his own part, Steve operates an online receiver at his station with an emphasis on HF reception. It tunes part of the LF band, but Steve says he would like to optimize its operation for LF in the future. His receiver for this site is a Ten Tec RX320. You can visit it at <http://onlinereceivers.net/rx322.php>.

Regarding PC reception, Perry Crabill, W3HQX (VA) writes: “The information in February’s *Below 500 kHz* column about VLF on your PC is interesting. It would be a good system for displaying whistlers if you were using a battery-powered laptop away from power lines. An experiment worth trying would be to connect the sound card’s input to a suitable microphone located outdoors to look for the sounds made by insects and birds. However, if it doesn’t respond to signals above 22 kHz, I don’t believe that you would be able to detect bats; I believe their acoustic signals are higher than 30 kHz.” (*Indeed, check out last month’s First Look review of an acoustic detector-ed.*)

❖ Mystery IDs Solved

Lee Badman, KI2K (NY) writes, “You may already know this, but the PYA beacon (260

kHz) in Penn Yan, NY is sounding very much like *PTW4* these days, with the first dash in the Y sounding like a stand-alone T.” *This appears to be a keying error at the beacon site (kc).*

Al Bauernschmidt, N3KPJ (PA) writes: “Regarding the mystery signal P&A in your March, 2009 *Below 500 kHz* column, I think I have the mystery solved. I have been receiving a beacon with an ID of *PPA* here at my location in Allentown, PA. From all indications it appears to be from Puerto Plata, Dominican Republic. It isn’t real strong, but I can copy it in the morning for an hour or two before local sunrise. I caught it this morning (March 9, 2009) at 0949 UTC with my Icom IC-R75 and a 96-foot experimental wire antenna around 448.70 kHz. Hope this is of some help to you. I really enjoy reading *Below 500 kHz* every month.” *PPA is assigned to operate at 450 kHz (kc).*

Thanks for writing, Lee and Al. I appreciate the information on these stations. Both have been reported recently by *MT* readers and this finally brings some answers to the mysteries. In the case of “P&A,” Ron Bailey (NC), also wrote by postal mail to report that this was probably PPA/450 kHz. Thanks to all for your reports!

❖ A New Mystery

Phil Gentile, AB2JL, in Redwood, NY is hearing beacon SU on 349 kHz with a 1020 Hz ID. It’s strong even in broad daylight, so it is believed to be a local, but this one has not turned up on any of the usual lists. If anyone has any clues to this station’s location, or would like to add a signal report, please drop me a line.

❖ Rochester Hamfest - May 30th

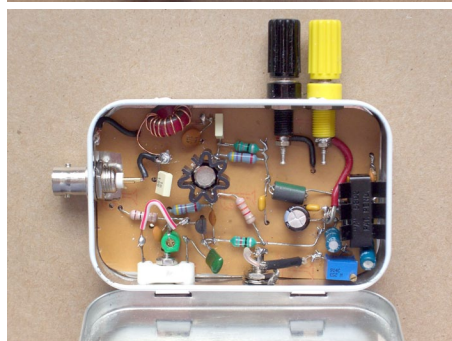
One of my favorite radio meets in the Northeastern U.S. has always been the Rochester (NY) Hamfest. The event has consistently been a great place to find vintage radios and parts, including longwave receivers and related accessories. I’ve written before about how I found a nearly perfect National RBL-5 there for \$40 a few years ago.

Celebrating its 75th year, the Hamfest has some exciting changes in store for attendees this year, starting with an all-new location. This expanded venue, located just outside the city, features nearly unlimited flea market space. There will be clubs, dealers, and traditional “tailgaters” at this meet. The event will be held on Saturday, May 30th. Full information is available online at www.rochesterham.org. I hope to see you in Rochester!

The Corsette Transmitter

This month we see a picture of the astonishing Corsette AM pirate transmitter. That is indeed a genuine Altoids box that contains the entire transmitter. In the particular version of the transmitter that we see here, **Channel Z Radio** says that they replaced the original LM386N-1 audio amp chip with a slightly higher powered LM386N-3, in an attempt to improve the modulation output from the transmitter.

Channel Z Radio has run numerous QRP



low power tests with this transmitter in recent months, and they report that the signals have been heard in several USA states, albeit with a weak signal. An expensive high powered transmitter is not always necessary on the shortwave bands, as these experiments proved. The ingenuity of radio hobbyists is often quite intriguing.

❖ Radio Cochiguaz Anniversary Broadcasts

Radio Cochiguaz, the most prominent pirate that operates from South America, has in fact celebrated their 12th anniversary on the air. During their anniversary extravaganza in February and March they operated on numerous days with low powered broadcasts on 6307 kHz from Chile and also from a relay in Europe on 6208 kHz using 20 watts of output power.

The station still uses Casilla de correo 159, Santiago 14, Chile, for postal mail correspon-

dence. They say that their www.geocities.com/rcochiguaz/ web site will provide updates on any additional forthcoming 2009 transmissions. When active in the past, this one has used variable frequencies around 6925 kHz and 11430 kHz.

The anniversary special broadcasts were largely low power affairs, and we received no loggings from *MT* readers who heard them. But, in the past, signals from this pirate have been audible in North America at times. So, it will be a good idea to keep an eye on these various frequencies in the future.

❖ Mexican "Pirates"

There currently is a minor civil war going on in Mexico. Frequent battles between various drug gangs and with the Mexican authorities have resulted in a rising death toll in cities such as Ciudad Juarez. *Reuters* has reported that a similar war in Tijuana has had some spillover into unlicensed broadcasting.

Some Mexican drug gangs have been transmitting on police radio frequencies with "chilling" death threats against particular police officers. On multiple occasions those death threats have then been carried out. After the death threat is carried out, some of the unlicensed broadcasts have then rubbed it in by going back on police radio frequencies with apologies for the killings with messages that "We are sorry." Understandably, this particular set of illegal transmissions has done little to improve morale among the Tijuana police.

Of course, neither *MT* nor its readers support gang violence, civil wars, or unlawful interference with police radio frequencies. But, this behavior is currently increasingly common in northern Mexico. We thank John Figliozzi, one of the Festmeisters at the recent Winter Shortwave Listener's Festival in Kulpsville, PA, for calling this one to our attention.

❖ Ragnar Joins FRW

The *Free Radio Weekly*, still one of the best resources for pirate radio loggings information in the world, has announced that Ragnar Daneskjold has joined the staff of editors at the *FRW*. Ragnar, the longtime producer of the *Pirate's Week* internet podcast with news about pirate radio and DXing, needs no introduction to *MT* readers. If you have information to contribute to *FRW*, or if you need information on how to subscribe to this e-mail service that is free to active contributors, you can use piratesweek@gmail.com to communicate with Ragnar. Both resources are valuable, and they deserve your support.

WHAT WE ARE HEARING

Monitoring Times readers heard more than two dozen different pirate radio stations this month. You can hear them too, if you use some simple techniques. Pirate radio stations never use regularly announced schedules, but shortwave pirate broadcasting increases noticeably on weekends and major holidays. You sometimes have to tune your dial up and down through typically used pirate radio frequencies to find the stations, but more than 95% of all North American shortwave pirate broadcasts are heard on 6925 kHz, plus or minus 30 or 40 kHz.

Captain Morgan- The captain's standard show is rock music mixed with TV audio bridges from the old Twilight Zone TV show. (None, send loggings to the Free Radio Network web site)

Channel Z Radio- They normally feature rock music and pirate radio discussions, sometimes via the Corsette transmitter that we discuss this month, sometimes with a power output of only one watt. (channelzradio@gmail.com)

Ernest T.- This new one has emphasized novelty versions of rock and country tunes so far, but otherwise we know little about it. (Unknown)

Fellatio Radio- They are still around. In one notorious broadcast they transmitted a SSTV photo of the activity described in the station name. (None known)

Gaga Radio- Uncle Bob's new rock music pirate has been widely heard. Some DXers also heard a reference to Northland Radio during their initial shows. (popeonthepoint@gmail.com)

James Bond Radio- This mysterious pirate is back. It plays only songs from the soundtracks of James Bond films. (None known)

Liquid Radio- Their playlist of rock music is eclectic, and you won't hear much of their material on licensed radio stations. (wwwrbfm@gmail.com)

MAC Shortwave- Paul Star has been active on 6925 kHz lately, as well as on other odd frequencies that he sometimes uses for his professionally produced rock oldies format. He occasionally is assisted by a young boy named Ultra Man. (macshortwave@yahoo.com)

Mystery Radio- This one still is the best heard European pirate in North America, with the best reception on weekends around local sunset near the east coast on 6220 kHz. Both voice and Morse Code IDs are broadcast. (radio6220@hotmail.com)

Over the Horizon Radio- This new rock music pirate has only been heard by a small number of DXers. An FM pirate **Horizon Radio** was busted in the UK in 1985. (Report through the FRN web site)

Possum Hunting Radio- It turns out that Truck Driving Man is the announcer on this station, and not the name of the station itself. His format has been instrumental music lately. (Unknown)

Punxsutawney Potthead Radio- As usual, this seasonal holiday station made an appearance on Groundhog Day this year. (Belfast)

Radio Azteca- Bram Stoker's pirate is the reigning champion of satire and comedy about DXers and DXing on shortwave radio today. (Belfast)

Radio Free Speech- Bill O Rights moved to an oldies

Continued on page 61

Let's Build Something

Elsewhere in this issue of *Monitoring Times*, you will find a feature article by your humble columnist listing the reasons why folks should become amateur radio operators. Near the top of that list is **YOU CAN BUILD YOUR OWN RADIO GEAR**.

I have said in the past that I probably spend as much time melting solder in my workshop as I do on the air. There is always something to build, modify and occasionally break (the fun comes when you figure out how to fix it again!)

Recently, I came home early from work and had the opportunity to get on the air for a few minutes before family duties took over the afternoon. I cranked up 40 meters on my Elecraft K2 and plugged in a recent find – a set of miniature paddles that I plan to add to my backpacking/kayaking/bicycling portable station. I was pleased to have the Op on the other end of the QSO come back saying that he was a fan of my *MT* writings. That is always gratifying and, for the sake of the magazine, I always go on my best behavior.

However, I have to admit I came up with a bit of egg on my face (or my fist as the case may be). You see, I had just pulled these paddles out of the mailing pouch they arrived in and didn't take the time to set them up properly. The result was an embarrassing, somewhat hamfisted QSO with Old Uncle Skip sending way too many error dits, and all in front of a loyal reader, too. All was forgiven as we worked through the QSO and subsequent QSL process. But this minor misstep made me resolve to be a bit more cautious with my key choices when getting on the air. Even a well adjusted key that has been on the shelf for too long can make a good CW Op sound bad. Practice always improves the production.

The solution is simple. Every CW Op's shack should have a good Code Practice Oscillator on hand. A CPO allows you to practice your sending "off line," so to speak. It's just the thing for learning CW if you are new to the mode, but it's still useful to the experienced CW Op when it comes to setting up keying systems.

I have a simple NE555 Timer chip CPO I built years ago down on my workbench. I dug it out and went through the process of adjusting my new paddles. The rather simple circuit worked well enough, but when I cranked up the speed a bit, I realized that the circuit was not as cooperative at higher speeds. The raw square wave put out by the NE555, even though smoothed through a capacitor or two, did not give a good representation compared to the paddles' on air performance. What is a serious CW Op to do about keeping a clean fist (and sounding good to loyal readers)?

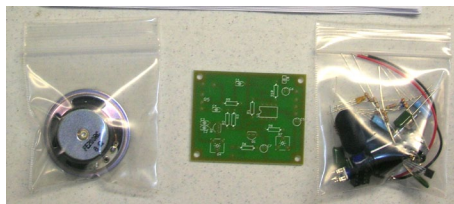
One of the first places I turn for CW system

support is to Marshall Emm N1FN and his Milestone Technologies Web site www.mtechnologies.com/, specifically his Morse Express section of that site. After I stop drooling over the many beautiful keys and paddles Marshall has to offer, it is possible to find other wonders on his site. Eventually, I clicked through to the MX T-Tone Code Practice Oscillator Kit.

❖ T-Tone Practice Oscillator

This kit caught my eye because of its significant improvement over the basic NE555 timer circuit.

The circuit was designed by the Morse Express team and Charles Olsen WB9KZY. The T-Tone Code Practice Oscillator takes its name from the fact that it uses a "Twin-T" oscillator circuit to provide a shaped sine wave tone. This eliminates the harsh sounding square wave signal that is common with NE555 timer-based CPOs as mentioned above. It also allows the CPO to operate better at higher keying speeds and volumes. I ran my unit up to over 30 WPM using a Vibroplex Champion "Bug" without any noticeable degradation in signal quality.



If you are familiar with the Oak Hills Research line of QRP gear, originally designed by ham radio legend (and *MT* columnist) the late Doug DeMaw W1FB, you may notice that the Twin-T design bears a strong resemblance to the side tone circuit that Doug put in such classic designs as his OHR-100A transceiver.

The oscillator circuit kit includes an LM-386 audio amplifier stage to allow the unit to drive the included speaker with enough volume to allow it to be used for training classes in small rooms. If you need more punch for a larger group, there is a dedicated "Line Out" jack to feed a larger amplifier.

The tone frequency and keying shape are fully adjustable by way of on board trimmer potentiometers. This is a very flexible circuit that should make any CW Op happy. The kit sells for \$19.95 from Morse Express. Order on-line at www.mtechnologies.com/misc/ttone.htm or call 800-238-8205 for credit card orders, or call 303-752-3382 for more information.

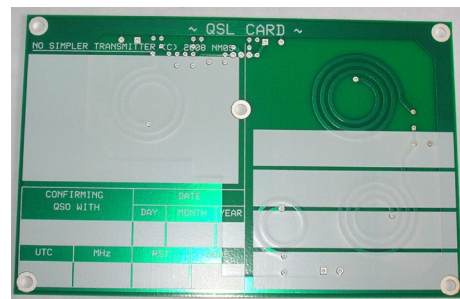
I built my T-Tone board up in less than an

hour. I put mine into a project case I had in my shack, but if you are not as well stocked as Old Uncle Skip, you can purchase a case from Morse Express for \$5.95.

While there are simpler (and less expensive) ways to skin the CPO cat, I would recommend the T-Tone Code Practice Oscillator kit to any serious CW Op. Your fist (and those who have to listen to it) will thank you!

❖ Now That's a QSL Card!

Over the 30 plus years I have been a ham. I have seen some very interesting and even entertaining QSL card designs. (If you ever received one of Del K4NBN's "Magnolia Blossom" QSL cards, enough said about that!) But I recently came across a simple QRP transmitter kit that, among its many unique features, includes the format for a QSL Card silk screened on the surface of the PC board. I don't know if one of these has gone through the mail as of yet, but when it does, I am sure the post office will be more than a bit confused.



This "radio built on a QSL card" is better known as the NS-40. NS stands for None Simpler. It is one of the latest designs in the growing "minimalist" radio movement. It has become easy enough to work the world with QRP and QRPp power levels. Been there, done that!

Now, folks want to go even further in their on air challenges, so they have begun designing rigs with the smallest parts count possible. The NS-40 gets the job done with just 14 components. The rig's designer, David Cripe, NM0S accomplishes this by etching the required RF coils right into the surface of the "QSL Card" PC board. With no coils to wind or toroids to play with, building this Class E type transmitter is a snap. Your cup of coffee won't even have time to get cold as you populate and solder the PC board.

The circuit consists of a 2N7000 oscillator driving an IRF150 final transistor as a Class E Amplifier. Both semi-conductors are keyed to

keep the signal clean and the attendant Low Pass Filter portion of the circuit keeps the harmonic rejection within acceptable limits for the 5 watts of output. Simple and clean QRP CW, what could be better?

As indicated, I had this rig up and running in well under an hour and was happily sending CQ on 7030 MHz. Reports back were 599. Using this rig is reminiscent of my forays into the world of 40 meters with my classic Tuna Tin II: Tons of fun for a kit that costs just \$30. Kits are available through the 4SQR Group, c/o Terry Fletcher WA0ITP, 1305 Casper Drive, Ottumwa, IA 52501. Please send \$3.00 extra if you are from outside the United States. Profits from the sale of this kit go to support OzarkCon 2009.

Several folks have already tweaked and peaked the NS-40 design, and all the additional information and ideas are being shared at: www.wa0idx.org/wa0itp/ns40.html

By the way, Dave's NS-40 design was the overall winner at 2008 "Four Days in May" QRP gathering that runs concurrently with the Dayton Hamvention. If you happen to be in the neighborhood of this year's show, be sure to check out Dave's presentation on Class-E Power Amplifiers. For more information about FDM, go to the QRPARCI Web site at: www.qrparci.org/

❖ Of Fish and Antennas

Everybody knows that folks who fish have been known to stretch the truth about their skills and abilities. ("Honest! That bass was this long!") Well, in the ham radio world, more than a few folks have been known to tell a tall tale or two when it comes to the qualities and abilities related to their antenna building. ("If you fold the legs of your dipole down one third of a wavelength, you will pick up 12 to 15 dB!") Antenna folk lore, and a few tall tales told, can send a beginner into a world of frustration when it comes to setting up their first station.

But, there is a way to cut through the fibs and failed facts that lead to false starts:

BASIC ANTENNAS

Understanding Practical Antennas and Design

By Joel R. Hallas W1ZR
ISBN# 978-0-87259-999-4
ARRL Order # 9994

\$29.95

The American Radio Relay League
225 Main Street
Newington, CT 06111-1494

www.arrl.org/shop
1-888-277-5289

As you know from columns past, I have always been a big fan of *The ARRL Antenna Book*. However, the sheer size of this tome can be a bit daunting for a beginner. As someone who writes a lot for folks starting out in the hobby, I have long hoped for a good book to fill in the gaps for folks starting out in ham radio.

Enter Doug W1ZR with *Basic Antennas*. This book gives folks new to thinking about antennas everything they need to build a good foundation (and turn aside any false prophets they may find as they grow in the hobby). Doug starts the reader out with basic concepts and theory that will help the reader really get his mind around what an antenna actually does (or cannot do). He

then proceeds to build on this knowledge base with actual examples of antennas that a ham may encounter or even build.

As a matter of fact, putting together your own antenna system that maximizes your local living situation is the major thrust of the book. Just about every antenna design a newcomer to the hobby is likely to encounter is discussed in detail, including all relevant theory and construction practice. HF and VHF antennas are covered, as are mobile and portable systems. The reader also gets a good understanding of how to take and make use of antenna measurements to optimize their personal set up.

Fair warning: there is a bit of math work in some sections, but Doug steps the reader through in a way that makes it no more difficult than the math skills needed to get your basic ham ticket.

I may be giving the impression that this book is for beginners only. This is certainly not the case. Even those of us who have been around the hobby for a long time have picked up more than a few bad habits. Also, occasionally we run across something that we have long forgotten. (When was the last time you calculated the focal length for the feed point of a parabolic dish?) This book has more than enough useful information to justify the cover price for any ham.

Basic Antennas belongs on any well stocked

Outer Limits continued from page 59

format in late winter by playing entertaining reruns of his excellent rock music, comedy, and advocacy shows from past decades. (Belfast)

Radio Pigmeat International- This now-veteran rock music pirate has nothing to do with pork. (pigmeat_voab@yahoo.com)

RPR- Using a slogan of "Real Pirate Radio," they primarily follow a rock music format. (None, asks for reports to the FRN)

Special Ed- The announcer on this pirate is not noted for his brilliance. (Unknown)

Sycko Radio- This now veteran pirate emphasizes rock music and comedy productions. (syckoradio@yahoo.com)

Undercover Radio- Dr. Benway still transmits "from the middle of nowhere" with rock music and narrative stories. He normally is around 6925 kHz, but he also used 1720 kHz this month. (Merlin and undercover-radio@gmail.com)

WBNY- This parody of clandestine radio stations from the Rodent Revolution remains popular with regular broadcasts from their leader Commander Bunny. Frequent cameo appearances by other pirate radio operators add to the mirth here. (Belfast and rodent-revolutionhq@yahoo.com)

WBCQ Relay- Although WBCQ itself promotes pirate radio production, this licensed station is sometimes relayed by actual pirates. Allan Weiner's on-air remarks suggesting that low power sideband pirates should instead buy relay time on licensed WBCQ is frequently the subject of these relays. (None)

WEAK- Leonard Longwire's rock music shows are again on the pirate band, and he already has sent out QSLs for the new broadcasts. (weak_chicago@yahoo.com)

Wind Up Radio- At the end of their rock music and comedy shows, they say that they are "all wound down." (Unknown)

WMR- This offshoot of WBNY chronicles the antics of DX monkeys with a "We Monkeys Radio" slogan. They play only portions of rock tunes since monkeys allegedly have short attention spans and won't listen to entire songs. (None announced)

WMPR- Their techno dance music shows still use the slogan of "Micropower Radio" that matches their call letters. (Known to QSL occasionally and mysteriously only at the Kulpville Winter SWL Fest)

UNCLE SKIP'S CONTEST CALENDAR

10-10 Int. Spring Contest (CW)
May 2 0001 UTC - May 3 2400 UTC

Indiana QSO Party
May 2 1600 UTC - May 3 0400 UTC

New England QSO Party
May 2 2000 UTC - May 3 0500 UTC
May 3 1300 - 2400 UTC

FISTS Spring Sprint
May 9 1700 UTC - 2100 UTC

Run for the Bacon QRP Contest
May 18 0100 UTC - 0300UTC

MI QRP Memorial Day CW Sprint
May 24 2300 UTC - May 25 0300UTC

CQ WW WPX Contest (CW)
May 30 0000 UTC - May 31 2359 UTC

amateur's bookshelf. Most highly recommended!

Well there you have it. This month you can build a Code Practice Oscillator, a unique little transmitter, or any one of dozens of excellent antenna designs. Can this hobby get any more fun? I'll see you on the bottom end of 40 meters.

WTCR- "20th Century Radio" plays music from the entire decade, from early 1900s pop to rock. (Belfast)

❖ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations. Letters go to these addresses, identified above in parentheses:

PO Box 1, Belfast, NY 14711
PO Box 109, Blue Ridge Summit, PA 17214
PO Box 146, Stoneham, MA 02180
Casilla 159, Santiago 14, Chile
PO Box 293, Merlin, Ontario N0P 1W0

The best bulletins for submitting pirate loggings for potential QSL are the e-mailed Free Radio Weekly newsletter, freeradioweekly@gmail.com and the Free Radio Network web site, at www.frn.net. The ACE, a formerly widely read print bulletin, now has a good loggings section and a valuable archive of *Free Radio Weekly* issues at www.theaceonline.com/

❖ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: Brian Alexander, Mechanicsburg, PA; Kirk Baxter, North Canton, OH; Artie Bigley, Columbus, OH; Ross Comeau, Andover, MA; Wendel Craighead, Prairie View, KS; Richard Cuff, Allentown, PA; Rich D'Angelo, Wyomissing, PA; Ragnar Daneskjold, North America; Gerry Dexter, Lake Geneva, WI; Bill Finn, Philadelphia, PA; John Figliozzi, Albany, NY; Harold Frodge, Midland, MI; Captain Ganja, Belfast, NY; William T. Hassig, Mt. Prospect, IL; Kracker, Belfast, NY; Ed Kusalik, Camrose, Alberta; Chris Lobdell, Tewksbury, MA; Greg Majewski, Oakdale, CT; A. J. Michaels, Belfast, NY; Cachito Mamani, Santiago, Chile; George Maroti, Mount Kisco, NY; Gene Patterson, Gibsonia, PA; Mike Rhode, Columbus, OH; Lee Silvi, Mentor, OH; John Wilkins, Wheat Ridge, CO; and Joe Wood, Greenback, TN.

Antennas for the Radio Amateur

Antennas are an important part of any radio enthusiast's radio gear. This month we take a look at the basic antenna designs most popular with radio amateurs. However, not too suprisingly, these antennas are quite popular with other radio hobbyists and radio technicians as well.

❖ Random-Length Wire

One of the simplest of the medium-frequency (MF) and high-frequency (HF) antennas is the random-length wire. And it is actually just a random length of wire! It can be any convenient length of wire you have available, or whatever length fits the space you have to put an antenna up. If used for transmitting, this antenna requires an antenna tuner.

❖ Dipoles

The half-wavelength design is the most popular dipole antenna; however, dipoles can be as short as a quarter-wavelength and still perform reasonably well. A horizontal dipole (fig. 1A) will support some decent high-frequency (HF) DX (long-distance) work when mounted in the neighborhood of a half-wavelength above ground. When mounted from about a tenth-wavelength to quarter-wavelength above ground, it provides near-vertical-incidence-skywave (NVIS) communication. This favors close-in coverage up to a few hundred miles or so out from your station.

Mounting configurations other than the common horizontal mounting produce different

radiation patterns. For example, mounting a dipole with one end lowered near the ground produces a sloper beam with modest gain and directivity. Lower both ends and you produce the inverted-V with its relatively non-directional radiation pattern.

❖ Grounded-Quarter Wavelength Antennas

A vertical, quarter-wavelength antenna mounted with one end at the earth's surface is known as a "Marconi," or "grounded, quarter-wavelength vertical" (fig. 1B). These are useful on the medium frequency (MF) and HF bands, although they are somewhat taller than most hams can manage for MF, or even for the low end of the HF band. Due to their low-vertical-angle radiation patterns, they are popular with hams seeking HF DX communications on the upper half of the HF band.

❖ Ground Plane Antennas

The basic quarter-wavelength ground-plane antenna design (fig. 1C) is relatively small, light, inexpensive, and performs well. These antennas are useful and popular from high frequency through UHF. On HF they tend to support DX (long-distance) communications, and for VHF and higher their low, vertical-angle radiation delivers signals out toward the horizon. At VHF and UHF, the smaller element size makes it practical to use extended vertical elements, which provide extra gain and flatter, low-angle radiation patterns.

❖ Common Beam Antennas

Beam antennas often improve communication when received signals are weak and/or interference is a problem. Beams focus their performance in a desired direction for both receiving and transmitting. This provides greater received-signal strength when used at the transmitting station or at the receiving station. Beams can be oriented such that the nulls (directions of minimal response) in the beam's radiation and reception pattern provide reduction of interference.

The popular beams for HF and into the VHF band are the Yagi-Uda beam (fig. 1D), the cubical quad (fig. 1E), and the log-periodic dipole array (LPDA) (fig. 1F). Both the Yagi-Uda and cubical quad can be designed as single-band or multiple band antennas. The LPDA, a very-broad bandwidth antenna, can be designed to cover several amateur bands.

The axial-mode, helical beam (fig. 1G) is a high-gain, highly-directive antenna which consists of a coil of wire wound as a helix. There is usually a reflector at one end of the helix. The dimensions of these antennas limit their use to VHF and higher frequencies where they see frequent use. This antenna is not to be confused with the normal-mode helical antenna which is essentially a long, thin coil, and whose performance is similar to a short dipole, not a beam.

❖ Weak-Signal Work

Hams use high-gain antennas such as arrays of Yagi-Uda beams (fig. 1H) or large dish-reflector beams for dealing with weak received-signals, such as in moon bounce and meteor scatter work. These antennas provide both high directivity and high gain.

❖ Phased Arrays

Phased-array beams (fig. 1I) utilize both spacing between the elements and control of signal phase by transmission-line length to produce directional radiation and reception patterns. Directivity of the beams can be controlled by changing feed line length. These antennas, like the long-wire antennas, require considerable space to erect.

❖ Loops

Large loops are useful for both transmitting and receiving on the HF band. These loops, such as the quad loop, have a circumference equal to one wavelength at their operating frequency. Smaller tunable loops with diameters on the order

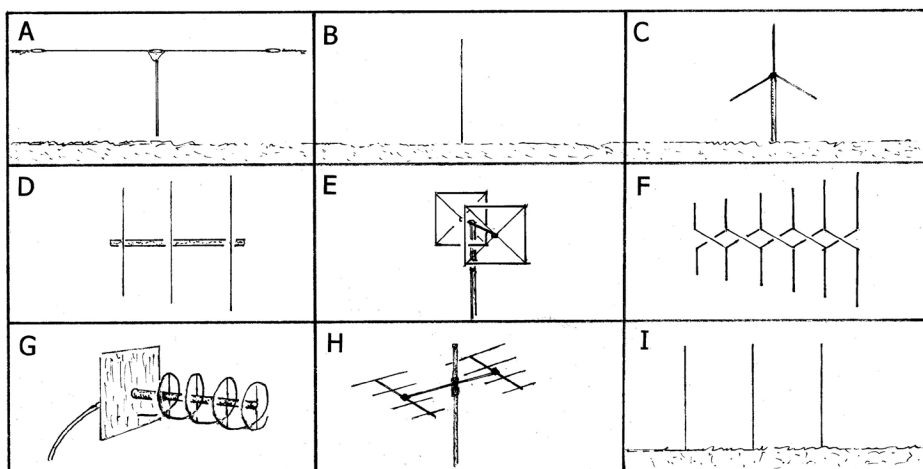


Fig. 1. A HALF-WAVELENGTH DIPOLE ANTENNA (A), A MARCONI, QUARTERWAVE ANTENNA (B), A GROUNDPLANE ANTENNA (C), TOP VIEW OF A YAGI-UDA BEAM (D), A CUBICAL-QUAD BEAM (E), AN LPDA (F), TOP VIEW OF A HELICAL BEAM (G), A YAGI-UDA BEAM ARRAY (H), A PHASED-ARRAY BEAM (I).

This Month's Interesting Antenna-Related Web site:

A large number of links to sites on many different amateur radio antenna designs: www.ku4ay.net/antenna.html
Another site with many ham antenna links: www.hamuniverse.com/antennas.html
A two-part series that gives a nice intro to antennas:
www.dxzone.com/cgi-bin/dir/jump2.cgi?ID=7565
The First 30 Years of Radio 1895 to 1925, an interesting article:
www.ns1763.ca/radio30/radio-first-30yrs.html

of several inches are useful for receiving. This is true especially at MF and lower frequencies, where putting up a resonant wire antenna is impractical due to the size of MF or longer wavelengths.

High Q tunable loops, on the order of a meter in diameter, produce good results for both transmitting and receiving on HF. However, these antennas have very narrow bandwidths and must be retuned for relatively small changes in operating frequency.

❖ Vehicular Mobile

The favorite ham vehicular mobile antenna from MF to UHF is a whip which utilizes the metal of the vehicle as its ground. These may be single-band antennas or designed with traps as multiband antennas. On VHF, a folded dipole bent into a circle to retain horizontal polarization is sometimes used for vehicular mobile communications.

RADIO RIDDLES

Last month:

I asked: "As explained above, an antenna's height above ground is important to its functioning. But some ground is more damp, or more rocky, etc. than other ground. Does this make a difference in the antenna's functioning?"

Yes: in dry and rocky ground the effective surface of the ground, as far as radio waves are concerned, is at some depth beneath the ground's actual surface. On the

other hand, for damp earth, the "surface" for radio waves is essentially at, or very near the actual surface.

This Month:

The above discussion left out a couple of unusual kinds of antennas that hams or radio technicians sometimes use. Although they can't be used to transmit signals or to receive stations off-the-air they are called "antennas." What are they?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

❖ Pedestrian Mobile

"Pedestrian mobile" is basically using a handheld or back-pack transceiver for radio communication while you are afoot. The most popular pedestrian mobile antenna is the "rubber duck" – a short, helically-wound, coil antenna which is both tough and flexible. Smaller versions of the rubber duck are the baby duck and the tiny, button duck. The duck antennas are very-low gain, non-directional antennas, with the baby and button ducks having progressively lower gain than the rubber duck. Use of these antennas demonstrates that, in many situations, low antenna gain can support communications reliably.

Antennas a full 1/4, 1/2, or even 5/8 wavelength in length are also available for handhelds.

These antennas significantly out-perform the duck antennas where signal strength is low. They have more gain and more effective radiation patterns progressively as length increases. The downside is that their length makes them unwieldy for pedestrian mobile work. This is particularly true of the 1/2 and even more so of the 5/8 wavelength versions, which tend to catch in doorways, on tree branches, etc.

❖ And So

The antennas discussed this month represent the designs most commonly utilized by amateur radio operators. They are useful to other radio enthusiasts, also. Of course, there are many other useful antenna designs, and we'll meet some of them in this column in the future.

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1 Year	<input type="checkbox"/> 32.95	<input type="checkbox"/> 42.95	<input type="checkbox"/> 52.95
2 Years	<input type="checkbox"/> 58.95	<input type="checkbox"/> 78.95	<input type="checkbox"/> 98.95
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An Entry-Level Ham Receiver of 1939

One of the first pieces of equipment needed by any new or prospective amateur radio operator is a receiver. The new ham would be anxious to begin putting together his or her station; the prospective one would be interested in "listening in" for the purposes of code practice or just getting a feel for amateur radio conversation. Let's say that you were in that position in 1939 and that, like many people of that era, you were on a limited budget.

Your attention would most certainly be drawn to the low-end receivers offered by the Hallicrafters company – which was probably the closest thing to a mass marketer for ham and shortwave listener clientele. Hallicrafters offered a lot of features for the money and their products were attractive and romantically named.

Even the low-end S-19R *Sky Buddy* offered a lot of value for the money. Its heavy crackle-finished cabinet and front panel made a very professional appearance. The five-tubes-plus rectifier circuit featured a 6K8 oscillator-mixer, 6SK7 i.f. amplifier, 6SQ7 detector-first audio-AVC, 41 audio output, 76 BFO and 80 rectifier.

In 1939, the \$29.50 S-19R had just been upgraded, at no extra cost, from its predecessor, the S-19. The S-19R now had electrical bandspread and its range had been extended to include 10 meters. It covered 545 kHz to 44 MHz in four bands.

❖ Enter the Sky Champion

However, if your budget could stretch another \$20.00, you would be able to enjoy a much more capable and modern looking radio. That would be the S-20R *Sky Champion*. Still a low-end receiver, it had been recently up-

graded from the previous S-20, at no increase in the \$49.50 cost, to include an extra i.f. stage, a noise limiter, electrical bandspread, and a drift-compensated oscillator.

Like the S-20, the S-20R's finish was a handsome semi-gloss "machinery gray" enamel with silk screened control labels. The front panel was similar in most respects, except for the additional noise limiter switch and bandspread knob. But one major cosmetic difference was in the main tuning dial.

The original S-20 dial, like that of the S-19R, was of the early-Hallicrafters-trademark circular "German silver" design – with all calibrations visible at once. But the S-20R's lighted, plastic, circular dial was mostly hidden behind a large escutcheon that exposed only a restricted frequency segment at one time. And to further aid the operator, the dial window carried markings to indicate which sets of calibrations corresponded to which bandswitch positions.

The tube complement of the S-20R was: 6SK7 r.f. amplifier, 6K8 oscillator-mixer, 6SK7 first i.f. amplifier, 6SK7 second i.f. amplifier, 6SQ7 detector-AVC-first audio, 6F6 audio output, 6H6 noise limiter, 6J5 BFO and 80 rectifier. Compare this with the S-19R's tube complement and you'll see that the S-20R with its r.f. stage, extra i.f. stage and noise limiter – not to mention its updated handsome appearance – was much more radio than the S-19R.

❖ Making a Choice

All of which brings us to the subject of our latest restoration – which is none other than the S-20R *Sky Champion*. As it happens, I have two examples of this radio. One of them came, many years ago, from a reader of my old *Popular Electronics* restoration series. He'd last used it in his college dorm room many years before sending it to me. I don't remember how I acquired the other one. Before doing anything else, I had to decide which example to restore and which to set aside as a possible parts source if needed.

The New SKY BUDDY
10 METER BAND
with
ELECTRICAL
BAND SPREAD
Check These
Features

- 6 Tubes with 8 Tube Performance
- 4 Bands
- Complete Coverage 44 MC to 545 KC
- Separate Band Spread Dial
- Built-in Speaker
- Beat Frequency Oscillator
- Pitch Control
- Send-Receive Switch
- Phone Jack
- Band Switch
- AVC Switch

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HALLICRAFTERS SKY CHAMPION
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CASH PRICE.....**\$49.50**

EASY TIME PAYMENT PLAN

Model	Down Payment	Per Mo. for 6 Mos.
S23 with crystal, less speaker.....	\$23.00	\$16.25
S23 with crystal and speaker.....	25.40	17.95
S19 Sky Buddy.....	5.50	4.83
S20 Sky Champion.....	9.50	7.31

The S-19R Sky Buddy and S-20 Sky Challenger – Detail from a 1939 Advertisement

Sometimes decisions like this require quite a bit of thought and some crossed fingers. I remember having a hard time choosing which of my two Hammarlund HQ-120s to concentrate on in a restoration done on these pages a few years ago. In this case, though, it wasn't too difficult.

The "dorm room" model had been stored under fairly benign conditions. The chassis had a heavy deposit of dust that did seem to be concealing some rust specks – but all in all it looked quite decent. The chassis of the other receiver had a heavy coating of rust in several areas, suggesting storage in a shed or garage for some of its life.

On the other hand, the front panel of the dorm set had a hole for an extra switch installed by the user – function as yet to be determined. And there were more extra holes, now no longer in use, in one of the side panels. The front and side panels of the other radio are, luckily, not in too bad shape – with no extra holes and a reasonably decent finish.

As it happens, the front and sides of the S-20R are made in an integral wraparound unit and thus will come out in one piece. So my plan is to graft the chassis of the dorm set onto the front and side panel assembly of the other radio.

❖ Under the Chassis

This model has a removable bottom panel, so I was able to get a look under the chassis of the dorm set immediately – without taking the cabinet apart. Several of the bottom screws were missing – which suggested that there might be signs of tampering inside. However, scrutinizing it carefully, I could see



The S-20R Sky Challenger – An Attractive Low-Cost Ham Receiver Introduced in 1939

no sign of any owner mods.

I didn't see any burned components or mouse nests either. However, I noted that much of the wiring is cabled, but not color coded – which won't help any later troubleshooting. And the wires have an odd fuzzy gray-colored insulation.

At first it looked like they had a coating of mold – which would have been quite a downer. But the stuff doesn't rub off, so I guess it's some type of cloth or fiber material that I'm not familiar with. I hope it's not asbestos! Maybe a reader can advise me here. At least there's no sign of any cracking or degradation.

All the original wax-coated paper capacitors are still in place. I see no sign of any repairs, but I've never come upon a sorrier lot of components. The under-chassis must get quite hot in its cabinet enclosure, because the caps are quite discolored and it looks like the wax has gone through several cycles of partially liquefying, congealing, and liquefying again.

It doesn't matter, though. Even if they looked good I would change them out – as I do all paper and electrolytic capacitors in sets that I restore. However, some of these caps, being partially buried under fairly immovable parts, such as front-end coils, look they are going to present quite a challenge to get at.

Because of the signs of "cooking," I'll be paying special attention to the graphite composition resistors, which are a mixture of the old "dogbone" and modern cylindrical types. With age and adverse environmental conditions, such resistors have been known to undergo significant increases in value.

❖ Preliminary Tests

I decided to begin, as usual, by checking the power transformer. This is a difficult component to replace – and a failure here could cause the project to be shelved indefinitely. Of course, I did have another chance at finding a good transformer, if needed, in the other set.

When I went to pull the 80 rectifier so I could power up the transformer without applying high-voltage d.c. to the radio's circuitry, I found my first owner mod. Instead of an 80, I found a 5Z3 in a neatly made octal-to-4 prong adapter.

A 5Z3 in a properly-made adapter is an exact replacement for an 80, but when I put the radio back together I will install an actual 80.

It's interesting to speculate on why the original failed. That tube normally doesn't go south without provocation. Perhaps there was a short in the set at some time, though I don't see any sign – so far – that there had been one.

Now it was time to plug in the radio for transformer testing. Remarkably, the rubber line cord was still flexible and intact. Quite often I have to take the time to replace a cracked and brittle cord before I can do even this simple preliminary test.

Switching the set on had little apparent effect. Since both pilot lights were burned out and the tubes were all metal except for the

removed 5Y3 and the 6F6 audio output tube, the radio remained mostly dark. However, the transformer's high-voltage winding was now putting out a healthy 350 volts on either side of the center tap. The 5-volt winding for lighting the rectifier tube and the 6.3-volt winding for lighting the other tubes in the set also checked out perfectly.

Now I wanted to remove and test the tubes, leaving them out of the set in preparation for a later chassis cleanup. But first, I decided to see if I could discover the function of the owner-added front-panel switch. It didn't take much examination to see that it had been put in to shut off the S-20R's pilot lights!

Why would anyone do that? One imagines a young kid listening clandestinely with earphones when he was supposed to be sleeping. An S-38 I once owned had a similar mod – but the person who did that, if he used it much, must have gone through a lot of 35Z5 rectifier tubes. They don't last long without a load on the pilot light tap. There would be no such problem with the 6.3-volt lights on the S-20R, since they run off the transformer's 6.3-volt winding just as the tubes do.

Now, one by one, the tubes were pulled from their sockets and checked. All tubes had been installed in their correct sockets and all tested perfectly. It is interesting that almost all of the metal tubes in the set had military markings. So this was probably either a military or post-war model.

❖ The S-20R During and After the War

According to a Hallicrafters ad in the 1945 *ARRL Handbook*, many S-20Rs were made for the military during the war. To quote from the ad: "Large quantities have been produced for the armed forces and have been used for training and communications purposes where performance was important, but the use of a complicated receiver was not justified." Another possibility is that my radio had been manufactured at the tail end of S-20R production just after the war.

As the same ad attests, S-20Rs were indeed being sold on the civilian market just after the war. But it wasn't long before Hallicrafters hired crack industrial designer Raymond Loewy to give its product line a major facelift, imparting a sleek, futuristic look to all models.



The S-40 – A Post-War Cosmetic Redesign of the S-20R by Raymond Loewy

Dressed in its new sheet metal, the radio that had been the S-20R now became the S-40.

The S-40 was new on the market when I was a high school kid studying for my ham license. Although I didn't buy one – opting for a military surplus BC-312 which offered much higher performance for about the same money – I did think that the S-40 was quite glamorous looking. And I still felt the old romance when I restored an S-40 some years ago on these pages. (If you'd like to review that restoration, it began in the June 2003 issue and continued every month through the January 2004 issue.)

This month I'm running some pictures taken from old Hallicrafters ads so you can compare the looks of the original S-20 *Sky Champion*, the S-20R version, the S-40 and even the S-19R *Sky Buddy*. See you next month, when we'll remove the S-20R's cabinet and panel so we can begin cleaning and rehabbing the chassis.

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The Xtal Set Society, Inc

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www.midnightscience.com

Hams Reaching Out to Youth

By Carl Herbert AA2JZ

Our amateur radio club meeting schedule is published monthly in the local newspaper, along with lots of other groups who use this medium to advertise their specialty. Included in our newspaper listing are a telephone contact number and a web site address.

As a result of that ad, Jerry, WA6QFC, received a call last fall from the Den Mother of a Cub Scout Pack¹. She was looking for a demonstration to help meet requirements for their achievement badges. SWLing (short wave listening), Amateur Radio, and Morse Code fit nicely into this category.

Not really knowing what to expect, we loaded up with demonstration items which were still packed from "Field Day 2008." (We put up an information booth for extra points. Hey, it was only four months ago: no need to put these things away too soon!) Add a homebrewed code practice oscillator to meet the code request, a QRP twenty meter rig, two meter portable and antennas from Jerry's stuff. I brought a few "homebrewed" items. And off we went to the next Pack Meeting.

❖ Our Youthful Encounter

I had created a handout containing a listing of the "dots and dashes" of Morse

Code, a copy of a sheet giving prefixes for amateurs in countries worldwide, and a "secret message" to be decrypted by the Scouts. I assumed that the "secret message" would absorb some of the time given us, and I wouldn't have to do much talking while they were doing that. (What a foolish thought!)

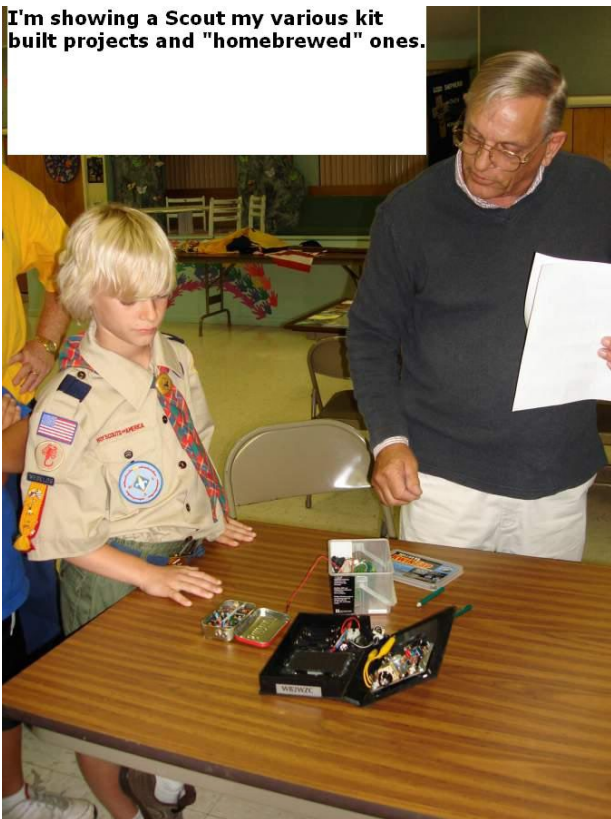
Jerry spoke first, demonstrating his "homebrewed" J-Pole antenna for two meters, and some ham activity on twenty meters. There wasn't a sound from the ten boys there — they were all intrigued by his equipment and the sounds from the rig!

Then it was my turn. One of the Scouts distributed the handout and pencils, while I began giving a short history of International Morse code, how it began and why. I briefly explained the prefix listing, and then requested that they "decode" the secret message in the handout. Too much talking and not enough "doing" leads to a boring meeting, so I'm told.

The majority of them finished the decoding process much faster than I had anticipated! These boys were hungry for something "new." Logical questions were asked about how to send the code, how long does it take to learn, who uses the code, what is the "ham test" like, and on and on. There was nothing "boring" about showing these youngsters what comprises some portions of our hobby.

Each one took a turn at sending Morse with the homebrewed oscillator. Some tried using the keyer paddles. (I turned the speed down to almost OFF, and watched the fun!) Sure, it was noisy and the Morse wasn't perfect, but they had a great time and so did we.

I'm showing a Scout my various kit built projects and "homebrewed" ones.



❖ Volunteer to Make a Difference

You often read complaints in the media about the scarcity of trained professionals, often claiming a lack of interest among our youths. You can make a positive impact on this sad situation. Volunteer to provide presentations at your local young people's groups. Scouting is one such group, but there are others.

Don't expect instant results; it doesn't work that way. Only one of many may continue into the world of electronics at this point, but many more will remember your presentation in later years. It might just have a positive effect on their lives. Youngsters haven't a "plan" for their future yet. But until they know what avenues are available to them and what is required to get there, logical decisions can't be made.

The reward for the amateur radio community is that the future generations of amateur operators, engineers, and more are out there. They're the "young generation," filled with ambition and desire. They haven't the expertise yet to become builders or operators, but for these inquisitive minds, the seed of knowledge has been planted.



Jerry and Cub Scout, going over the "secret code" project and then trying it on a code practice oscillator.

Hopefully, all it took was a donated evening to present some “old hat” material, and an hour’s work on a computer creating a handout to spark their interest.

❖ Cub Scout Key

It was rewarding in our initial visit to see the apparent interest these boys had for “ham” radio. A fun filled hour was spent listening to Morse Code, inspecting QSL cards, and more. The hour was far too short of a time to tell all we wanted to tell.

Scouting is divided into different age groups. This division by age insures that the technical knowledge required for a project isn’t beyond the capabilities of the boys. “Cubs” are younger boys between 7 and 10 years of age. They’re in an active phase of their lives, and often haven’t begun to learn patience as a virtue. If a project is excessively technical, they will soon become bored and disinterested. At this age, they’re a group of fast moving, ambitious boys, looking for fun at every turn. This is no place for a long discussion about any topic.

One requirement the Cub Scouts have is called “Communicating.” Cubs learn about various methods of communication and are required to complete projects relating to that topic. They earn “Belt Loops” to wear on their uniforms, indicating that they have accomplished a specific goal. Accumulating these items is part of the progression from Cub Scout to Boy Scout.

One of the assisting parents indicated that

the group was looking for a project for their group, one that would meet the requirements for the “Communicating” loop. I made the comment that I could possibly create the required project and would be happy to assist them with the endeavor.

I had no idea what I was getting myself into!

❖ The Project

Attached is a picture and schematic of the code practice key I designed to meet the project’s requirements. Fourteen units were required, so low cost was a definite factor. I was also concerned that fourteen young boys with hot soldering irons, etc. wasn’t something I wanted to be part of. I had mental visions of the assembly process rapidly becoming a lesson in “first aid.”

I purposely selected resistor and capacitor values that would provide an adequate tone, while ensuring that the audio gain is usable but towards the low side. I did this as a courtesy to the parents who will no doubt be assaulted by “dits and dahs” in the near future.

The base is four inches by six inches of half inch common pine. I bought the cheapest, nearly knot free, eight foot piece I could find at the local home improvement store. The “key arm” is a five inch section of half inch banding strap, also from the home improvement store, but reconnoitered from their dumpster. This metal banding’s primary function is to strap

lumber for delivery to the store.

The “handle” was created from one inch “hole plugs” found in the wood working section. They’re sold in bags of six or seven, and their intent is to fill screw holes in a wood working project in preparation for finishing. Each “hole plug” was drilled in the center, to allow for a machine screw, washer and nut to attach it to the “key arm.”

In lieu of having the boys perform soldering, I opted to complete the NE555² circuit boards and attach them with hot glue when finished. Each “board” was tested with its associated “speaker” prior to attachment to the base. Once the “hot glue” is applied to the circuit board and it is nearly impossible to remove it for repair. Better to test the parts *prior* to gluing.

The audio device is a piezo³ type speaker ordered via the internet. It is also “hot glued” to the base. The speaker leads I chose are colored yellow, but any

color other than red or black will suffice. I wanted a different color to avoid wiring errors during assembly. The wire was salvaged from a computer switch box. Power and ground leads to the board are the common red and black variety.

Once I was satisfied that the boards functioned as required, the circuit board and speaker were hot glued to the base.

Screws and flat washers (#6) were used to hold down stripped and tinned wire ends to make the connections. “Tinned” means that the exposed wire has been coated with solder to hold the multiple strands as one, thus giving the strands more substance. This was done to provide a more workable end for the boys, with less chance of them breaking the wires.

❖ Scout Pack Night

Even the most careful planning can go awry! Each boy was informed that he would be required to bring a 9 volt battery and a flat-bladed screwdriver for the evening. Of course, some forgot, and some said that they didn’t have a screwdriver. Oh well, just take some extra screwdrivers with you when you go. The batteries were provided by the leader, purchasing them from their “kitty.”

Kits were distributed, screwdrivers brought to the table, and assembly began.

The idea of using screws and washers worked well. Not all boys are dexterous, and using this method eased assembly considerably. Each kit also contained a printed picture of the completed kit, with the color connections and screw locations identified on it. This was a very handy item to have for several of the scouts.

I was thankful to have several adults present to assist them with the kit. Their mentoring made my work much easier. The “kits” were assembled much faster than I had anticipated. The time allowance for the project was one hour, and the project was completed in less than that.

A word of caution is required here: **DON’T ISSUE THE BATTERIES UNTIL ALL THE ASSEMBLY IS COMPLETE!**

I’m sure you can imagine why: The ensuing noise from those who managed to finish their kits first, will obliterate any discussion you may wish to have. It was a joyous noise, though, and the smiling faces of those young boys were all the reward necessary.

Each “key” worked as designed – well, maybe one or two needed some “wiring corrections.” But each went home with a boy who was proud of himself for having completed the project.

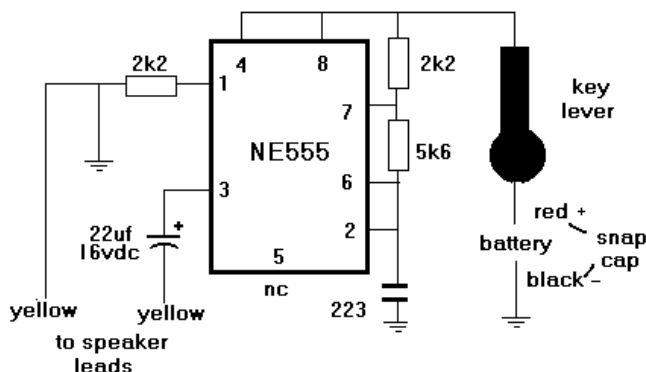
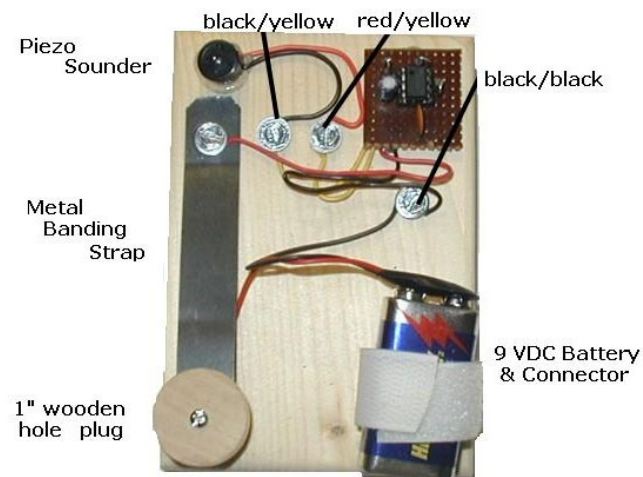
This is an easy, yet inexpensive project that was welcomed by the Scouts and hopefully will inspire some to become hams. Perhaps you could become involved with a project such as this. Not all are Scout related, but there are groups just waiting for your talents!

Happy building!

Notes:

1. www.scouting.org
2. contact@sun-pac.com (ebay purchase) NE555 and SnapCap battery connector
3. www.allelectronics.com piezo p/n PZB-25

Cub Scout Morse Code Oscillator



Cub Scout Morse Code Practice Oscillator

Ham Antennas by Par Electronics

By Larry Van Horn, N5FPW

This month we got a chance to test two ham antennas from the Par Electronics Company located here in North Carolina. We will be testing a 15 meter End-Fedz and a 6 meter Moxon.

❖ Par HF Ham End-Fedz

All of the Par End-Fedz antennas are full length, half wave dipoles, but with an important difference: The coax connector is at one end of the dipole. These antennas can be mounted horizontally, vertically, or as a sloper. No ground plane or counterpoise is needed.

I hung the antenna's far end from a tree limb and the coax at the bottom. The end insulators made suspension easy.

Here are some of the engineering specifics regarding the family of Par End-Fedz antennas: The UV resistant ABS plastic housing encloses an efficient matching network, allowing the antenna to be fed with common 50 ohm coaxial cable.

All hardware is stainless and the SO-239 connector is silver/teflon. The radiator wire is custom made in 21 mile runs. It is a #18 gauge stranded copperweld with a tough polyethylene jacket. Breaking strength is 200 pounds and, unlike the vinyl jacket found on the vast majority of antenna wire, the polyethylene jacket is 100% UV stable, very tough and slippery – almost like Teflon®.

One end comes with a #10 solder lug, making attachment to the matchbox simple



and allowing the radiator portion to be replaced if it ever becomes necessary. Power rating is a conservative 100 watts.

These antennas are lightweight and they are ideal for portable work. The all black construction makes them difficult to see. I would highly recommend these antennas for hams who live in areas with restricted antenna covenants.

Six years ago I tested the SWL version of this antenna (EF-SWL); see the September 2003 issue of *Monitoring Times*. I found this antenna to have superior performance, including noise reduction techniques, over antennas having a much larger capture area.

After testing the 15 meter version of this wire antenna, the family of HF Par End Fedz appears to exhibit similar characteristics as its EF-SWL cousin. The radiation pattern for these antennas is identical to a center fed dipole. They have an exceptional low-noise characteristic when compared to other antennas that I have used here on our Brasstown antenna farm. I found this antenna comparable to a 40 meter version of the G5RV. With the matchbox and a proper pruning of the 15-meter End-Fedz, a tuner was not required for

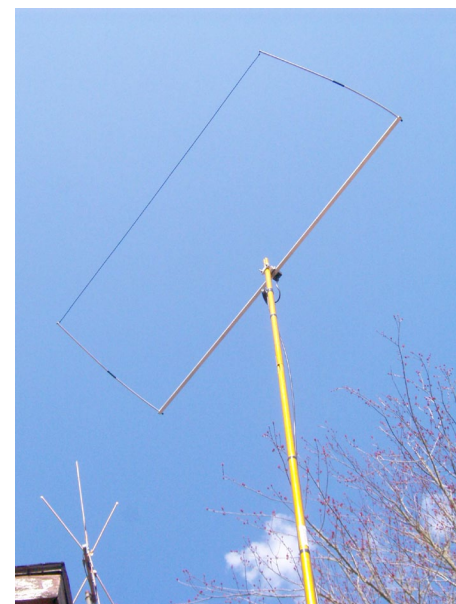
proper operations of the antenna. The antenna has a bandwidth of about 400 Hz between 1.5:1 points.

I highly recommend this family of wire antennas for hams who need a portable antenna or have limited space. Prices vary depending on the model; call for pricing.

❖ Par SM-50 6 Meter Moxon

This antenna is a clever version of G6XN's Moxon design for 6-meters. If you aren't familiar with what a Moxon antenna is, it's essentially a two-element Yagi that has its element ends bent back toward the opposite element to form a rectangular shape. Not only does this shrink the size of the antenna when compared to a Yagi, but it also improves the electrical performance of the antenna. This antenna will give you nearly the same gain as a 2-element Yagi, and a front to back ratio equivalent of a 3-element Yagi.

The SM-50 is a directional 6-meter antenna occupying approximately 50 percent of the space of a 2-element Yagi, yet having similar gain and better front to back. The stressed design allows the antenna to be lightweight yet strong. Once the matchbox and reflector wire are attached (using a Phillips screw-driver) the antenna tunes and mounts without tools. In addition, it can be broken down and reas-



HF End Fedz Specifications

Power Handling: Depends on model (see chart below)

Connector Type: Silver/Teflon SO-239

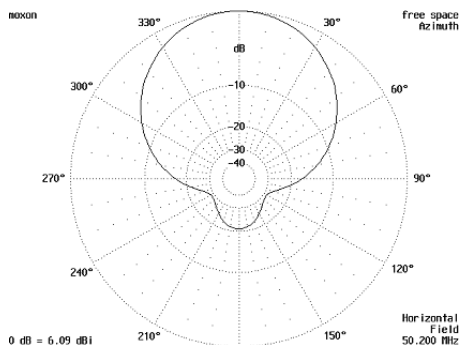
Radiator: Custom #18 Stranded Copperclad

Radiator Coating: Black Polyethylene

Hardware: Stainless Steel

Polarity: Determined by User

Model	Band	1.5: VSWR	Length	Power Handling (Watts)
EF-40	40 meters	225 kHz@2.1	66 feet	200W
EF-30	30 meters	1.5:1	45 feet	200W
EF-10/20/40	10/20/40 meters	500/300/100 kHz@2.1	40 feet	25W
EF-20H	20 meters	300 kHz	33 feet	300W
EF-20	20 meters	300 kHz	33 feet	100W
EF-17H	17 meters	350 kHz	28 feet	300W
EF-17	17 meters	350 kHz	28 feet	100W
EF-15H	15 meters	400 kHz	22 feet	300W
EF-15	15 meters	400 kHz	22 feet	100W
EF-12H	12 meters	500 kHz	15.5 feet	300W
EF-12	12 meters	500 kHz	17.5 feet	100W
EF-10H	10 meters	600 kHz	16.5 feet	300W
EF-10	10 meters	600 kHz	16.5 feet	100W
EF-6	6 meters	1.2 MHz	9.2 feet	300W



sembled in under a minute, making it ideal for portable/rover use.

❖ How well does it work?

I was very impressed with the performance of this antenna. Not only are local noise levels reduced (in my noisy RF environment), but the antenna forward gain and front to back are exceptional. When I turned the antenna 180 degrees away from the signal I was trying to receive, the 16 dB front to back knocked even local signals down in signal strength. Even under dead band conditions, I could hear stations in the Atlanta area over 90 miles away with reasonable signal levels. I even heard several 50 MHz beacons under dead band conditions that have never been heard before in my shack.

While we aren't in the E-Skip season as this antenna is being tested, I did jump up to 50.260 MHz and conduct some meteor scatter (JT6M and FSK144 mode) communications.

The SM-50 performed quite well, and even with 50 watts, communications were possible with several stations in the midwestern United States.

Construction of this antenna is solid and should give the user a long life, even under some harsh environmental conditions. The suggested list price for the SM-50 antenna is \$79.00.

So, if you are looking for an easy antenna to install, or something you can drag along for field day, this antenna is one of the most cost-effective antennas for 6-meters that I have tested. Now if I could only get some sunspots to test out some F2 skip and add a few countries to ye ole logbook!

SM-50 Specifications

Polarity: Horizontal
Gain: 5.8 dBi
Front to Back: 16 dB
Design impedance: 50 ohms
1.5 VSWR bandwidth: 1.4 MHz between 1.5:1 points
Power handling: 1000 watts
Weight: 3 pounds
Size: Rectangular 84 inches by 31 inches
Hardware: Stainless Steel
Mast Bracket is supplied: 3/4 inch to 1-1/2 inch mast are accommodated

❖ How to Purchase

Dale Parfitt's service is excellent and the quality of all components is a very high standard in both of the antennas we tested. I should note that due to the high demand for

Par antennas, you may have to wait up to 60 days after ordering your antenna to get it in hand. But your patience will be well rewarded with a quality product that will perform quite well.

Par antennas are available from Grove Enterprises or direct from the manufacturer.

SOURCES

Grove Enterprises, 7540 Highway 64 West, Brasstown, NC 28902; telephone: 800-438-8155; FAX: 828-837-2216; www.grove-ent.com

Manufacturer:

Par Electronics, Inc., P.O. Box 645, Glenville, NC 28736; telephone: 828-743-1338; FAX: 828-743-1219; www.parelectronics.com, w4op@parelectronics.com.

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TENTEC

MT REVIEW

Degen DE1123 AM/FM/SW Pocket Receiver *Good Performance and Bonus Recording/Playback*

By Gary Sargent, KE8WO

A new pocket-sized AM/FM/Short-wave receiver was released late in 2008 by Degen that has some interesting features, including digital recording and playing MP3 files. The new Degen model DE1123 joins a growing field of Degen models, including the DE1102, DE1103, DE1121 and a host of others. I was anxious to learn more about this attractive, very small receiver, so I acquired one.

Inside the Box

DE1123 radio
120 VAC to 5 VDC power adaptor (CE approved)
Standard USB to mini-USB cable
Three AAA 650 ma Ni-Mh batteries
Stereo 'ear-bud' style headphones
Carry pouch & small carry strap
User's manual (in English & Chinese)

The 1123 is about 3 by 5 inches and a small 1/2 inch 'thin'. It is light weight with appropriate fit and finish, though mine had a few minor scuff marks on the back case. It has a nice look and solid feel. All buttons have a positive feel as you use them. The only connectors are a standard stereo jack for headphones and a mini-USB connector for remote power and connecting to your PC. (See the DE1123 photo.)

The display is surprisingly large and readable in direct or reduced light and has an attractive green backlight that remains on 15 seconds after any button is pressed.

The thin profile means it cannot stand upright, but, since the antenna does not tilt or swivel, laying the unit on a table will result in the antenna being in a horizontal position. The radio does work well in a shirt pocket, as I'm sure was intended.

Only a few multifunction buttons are available to operate the radio. No numeric keypad or rotary tuning control is provided. You will need the user's manual for the first few hours as you learn the various features. The small manual is 26 pages and is only adequate for explaining the unit's operation.

Neither the DE1123 box nor provided manual nor other printed inserts provided any sort of warranty statement. I purchased my unit from Amazon, and the Amazon web site specifies "30-day money back guarantee and 1-year Manufacturer's warranty." Kaito Electronics actually was the seller and likely would be the warrantor for this 1 year period.

❖ Radio Performance

I decided to compare the DE1123's performance to my Degen DE1103 receiver. The 1103 is comparably priced, is in wide use, and is a top-notch performer in the \$75 to \$150 price range of portable receivers. For the comparison, I only extended the 1103's whip to match the 1123's meager 10 inch whip antenna.

The 1123 offers good performance in the AM MW range with sensitivity only slightly reduced compared to the 1103. The 1123 selectivity seems to have less adjacent channel spill over than the 1103 when the 1103 is set to the wide filter setting. The AM band was free of internally generated noises and heterodynes, except some minor internal signals were heard at 1700 kHz and seemed somewhat associated with the display's backlight. The audio was slightly distorted at very low levels but was less noticeable at more typical listening volume settings.

FM performance also compared very favorably to the 1103 in both sensitivity and selectivity. Remote stations only 100 or 200 kHz from a powerful local station could be received. Powerful locals did not swamp

large sections of the band as has been the case on some lesser performing receivers I have used. Stereo audio in headphones was free of noise and had high quality sound at all volume settings. The 1123 does not have any form of base or treble controls to tailor audio.

SW coverage is from 2.3 through 23 MHz. A single button will step through the 49m, 41m, 31m, 25m, 22m, 19m and 16m bands. The 1123 sensitivity is a step behind the 1103, more so on the higher frequency bands. Some stations that were very weak but readable on the 1103 were either not detected or not readable on the 1123. Again, the 1123 does have good immunity from splatter from another station just 5 kHz away. Adding more than a few feet of wire to the whip will overload the receiver. There is no connector for an external antenna and no signal attenuator button.

There are two SW performance caveats: I live in a typical suburban area (Dayton, Ohio) with a mix of local AM and FM radio stations. In particular, there is a 5 kW AM station on 1290 kHz about 5 miles away that has interfered to some extent on all of my radios (including a Sony 2010 and an Eton E1). This station and other locals show up on nearly all of the SW bands on the 1123 as a clear or garbled subdued background on many channels. This is not too much of a problem for medium to strong signal SW stations. Shortening the whip will often reduce this interference. However, for weaker stations this is an annoyance. Users without local AM stations will likely not experience this.

Secondly, the 1123 is very sensitive off just the short whip. I find that the 1123 will overload with the whip antenna at night time when the 49 meter band is booming in. Major stations can be received best with the whip antenna fully collapsed. Often readability is improved by plugging in headphones.

Overall, I much prefer the 1103 over the 1123 for SW usage when its size difference is not an issue. The 1103 is more pleasant sounding with its speaker or with headphones, in addition to its superior sensitivity.

❖ Digital Recorder / Player Performance

The 1123 can record AM, FM or SW



to its internal flash memory while in the receive mode and even when switching from one band to the next and tuning around. All recording is performed in the mono mode with a low sampling rate of 4 bits at 8 kHz and is saved as a "WAV" formatted file. This means recording quality is entirely appropriate for voices but not high-fidelity for music recording. The volume must be turned up to nearly maximum while recording to ensure the playback audio levels are loud enough, but this is not convenient if you are listening at the same time. Using headphones with an inline volume control is a work-around.

The 1123 can be set to play back a file based on an alarm setting but cannot be set to record based on a date and time for unattended program recording. The record function must be activated by pressing the record button and stopped by pressing another button. This, then, is a major limitation on the usefulness of the recording feature.

The 1123 does feature a built-in microphone for basic voice recording uses. I found it was appropriate for voice work within a few feet of the unit. The recorded audio levels for sounds some distance away (say in a conference room) will be low. Recorded voices sound natural and normal on playback.

Playback of MP3 and WMA audio files is supported by the 1123 and produces good fidelity on headphones. These files are copied to the 1123 from your PC via the USB connection (see below). During playback of these files, the file names and folders names are strictly numeric ... no textual file, folder, or track information is displayed. Basic playback controls such as fast forward (at about 20x), reverse, pause, etc. are provided. But there are major omissions of features that you would find on typical MP3 players. I would consider the MP3 and WMA features acceptable for an entry level user who only wanted to listen to the 1123 in this mode occasionally.

The 1123 contains 1 gigabyte of flash memory for storage of these audio files. Degen says this is adequate for nearly 70 hours of recording from the radio (at the rate of about 14 megabytes per recording hour) or hundreds of MP3 or WMA files. Any mix of these files is supported as well and share the 1 GB flash memory.

❖ Computer Interface

I connected the 1123 to my Windows XP PC via the provided USB cable. A key point to remember is that the 1123 must be turned on and in the "MP3" mode. The 1123 was immediately recognized as a flash storage drive and the appropriate drivers installed without any actions on my part.

Once this process is completed, you may use Windows Explorer to move WAV, MP3 or WMA files to or from the 1123, create folders, etc. The USB interface is version 2, so the file transfer process is fast. The user's manual only has two small pages discussing the usage of the 1123 with a computer and does not specify which Windows versions it supports or if it is workable with a Mac.

HEART OF THE DE1123

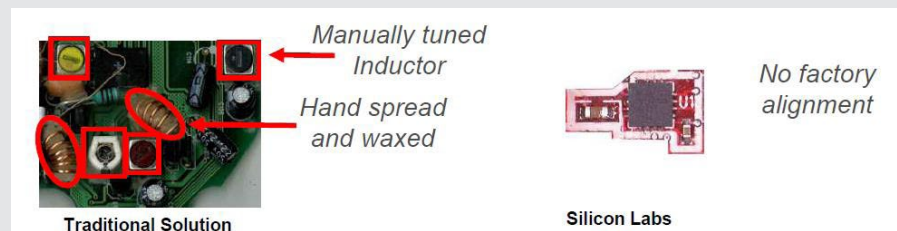
The key component of the Degen DE1123 is a single tiny electronic AM/FM/Shortwave receiver on a chip made by Silicon Labs. The Si4734 integrated circuit chip in the DE1123 is about the size of a pencil eraser and provides all of the 1123's radio capabilities with just a few external components. (The DE1123 also uses a microcomputer to control the Si4734, respond to the buttons, to control the display and provide the digital recording and playback features.)

This Si4734 IC chip first converts the incoming signal from the antenna to a very low intermediate frequency (IF). The signal is then converted to a digital form for all subsequent signal processing using digital signal processing (DSP) techniques. After this signal processing, the recovered audio is presented in analog form for amplification to drive the speaker. So technically, this is a single conversion receiver, but with the DSP providing at least some of the benefits of a second conversion step. This is a highly integrated form of a Software Defined Radio (SDR).

The Si4734 chip provides (not all used on DE1123):

- Excellent real-world performance
- Frequency synthesizer with integrated VCO
- Advanced seek tuning (based on programmable SNR and RSSI)
- Automatic frequency control (AFC)
- Automatic gain control (AGC)
- Digital FM stereo decoder
- Programmable de-emphasis
- Adaptive noise suppression
- AM/FM digital tuning
- AM tuning steps down to 1 kHz; Bandwidths selectable from 1 to 6 kHz
- No manual alignment necessary
- Volume control
- Programmable soft mute control
- RDS/RBDS processor
- Optional digital audio output
- Firmware upgradable
- Wide range of ferrite loop sticks and air loop antennas supported

The difference from a traditional radio design is dramatic. The figure below shows a comparison of a portion of a traditional design to a Si4734 based design. Notice the Silicon Labs Si4734 does not require the usual coils, transformers, capacitors, etc., nor the tuning and alignment of these components.



I suspect that this is the future of low to medium performance consumer radios in the future. (The above information is courtesy of Silicon Labs.)

❖ Bottom Line

The DE1123 Pluses

Pocket sized
Good sensitivity and selectivity for AM, FM and SW performance
Basic audio recording and playback features
Easy to move audio files to and from a PC

The DE1123 Negatives

No ability to schedule unattended radio recordings
No numeric keypad, slow frequency selection via provided up and down buttons
Limited audio file playback information display and playback features
SW interference from strong local AM MW stations and overloads easily

The DE1123 offers very acceptable overall radio performance in a small, extremely portable package. The digital audio recording

and playback features are more basic. The 1123 will appeal to users looking for the ultimate in portability in a multiband receiver, with good performance and the ability to work with WAV, MP3 and WMA audio files. It is available from several suppliers with a street price in the \$80 to \$100 range.

MT READERS ONLY

To access the restricted website for the month of May, go to www.monitoringtimes.com, click on the key, and when prompted, enter "mtreader" under the user name. Your password for May is "digital" – Check in each month for new material!



13,000 World Radio Stations: The Tiny USB Muzee

For me, a visit to a good quality discount store, which sells odd lot/closeout merchandise, is like going on a modern day treasure hunt. You never know what you'll find discounted to a ridiculously low price. Last week, while walking through one of my favorite of these stores, a large blister package caught my eye. It boldly announced, "WORLDWIDE Internet Radio." And under that, "Instant access ... to over 13,000 radio stations worldwide." Hummm. It had my attention enough for me to stop and pick it up.

Next to the pronouncement in the package was a device that looked like a half-sized USB stick or jump drive. (See top of Figure 1.) What exactly was this product? Called Muzee, it had a regular price of \$49.99, but was now reduced to \$18.99. An even more pressing question was whether I could resist buying it?

I know full well that many medium wave, FM, shortwave and scanner stations can be heard on the Internet. In fact, it was a subject of this column over four years ago. Since then the number of radio stations streaming their programming on the Internet has exploded. And most, if not all, are available for free. All it requires is an audio program such as RealPlayer or Windows Media Player and an Internet connection, high speed preferably. So what additional features could Muzee offer?

Reading the package further and ignoring the English errors, the Muzee model IR-6/4777 promised, "Listen to Broadcast in over 100 Countries". "Stores your links." Bookmarks can serve the same function, I thought. "Automatically updates new station." Now, that one could be very interesting. "Record music to your hard drive." Nice. How could I resist all this and 13,000 stations worldwide for \$18.99? I couldn't.



Figure 1 – Plug in the tiny Muzee and...bam... this screen appears, ready for listening. Muzee hardware seen at top.

❖ It's Mine - Now What?

Once home I fired up my RFPC, Radio Friendly PC (available at www.HCSS@att.net). This system has an Atom 230 1.60 GHz processor running Windows XP Home Edition SP3, with a bus speed of 533 MHz, 160G SATA hard drive, 2 Gig DDR2 RAM, DVD/CD writable drive, Realtek ALC662 audio sound ports and a video port using the Intel Graphics Media Accelerator 950.

Then I attached a pair of speakers to its soundcard output and cut open Muzee's package. First I checked it out on the Internet. According to its website http://en.muzee.net/index_flash.html these devices are now being sold in a slightly different package and now called "Muzee 1G Magic Music Dongle." The new model boasts a 16,000 stations capability. We'll look at the model I bought, model IR-6.

Muzee IR-6 will work with Windows 98/2000/XP/Vista operating systems. Its CPU minimum requirements are Intel Pentium III 700 / Celeron 667 or AMD Athlon 3500+. A PC having 10MB of hard drive space, 256MB of RAM and a USB port are its modest hardware needs. An Internet connection, IE or Firefox and Media Player 9 or higher are required. The RFPC easily met all requirements. The 1G model, seen on the Muzee website, has dropped its support of Windows 98.

❖ Installation and Use

The unit came with a small page of paper with basic instruction, but the box says it all.

"Plug" the device into a USB port. "Click" the menu that appears. "Listen."

All it took was 1 then 2 and I was ready to do some listening. During the installation, an ActiveX application was automatically loaded and run (more on this later). After selecting a language, the menu shown in Figure 1 appears, displaying the Top 10 Genre. A Category selection is made from the menu at the far left. The possible stations are then shown in the large area to its right.

❖ Pick Your Listening Target

In Figure 2 we have selected "Station – Genre." Then we scrolled down the list of 56 different program types or genre, as seen at the right of the display. Here we have selected number 55, "Scanner."

Finally, we are presented a list of thirty pos-



Figure 2 – Choosing stations by the genre category, we found websites that stream scanner audio.

sible "stations" streaming scanner radio audio. In Figure 3, by clicking on the small arrowhead we have chosen to listen to a scanner located in Australia's New South Wales. Very cool! Muzee's scanner list contains "stations" from the USA, Russia, Australia and Sweden.

This screen displays other useful information. The four bars to the right of the station name in the list tells us which stations are streaming (green) and the quality of their Internet connection. Clicking the small "house" icon next to the bars will take our Internet browser to the home website of the "station."

Another station genre that may be of interest to MT readers is "Talk, News." In addition to commercial radio stations from all over the world, this category lists stations such as BBC, CBC, NHK, Radio Cairo, Radio New Zealand, Radio Netherlands, Radio Pakistan and others. Another interesting genre is "Public Radio."

Not surprisingly, there is no Genre list for Shortwave. However, the easiest way to find a specific station is via the "Search" window. This window sits at the top of the Category list seen at the left side of Figure 4. I found this the best way to find shortwave, scanner and ham broadcasts.

The "Station – Region" category is another useful method of finding stations. Clicking this category brings up the map of earth seen in Figure 4. Clicking on a continent displays a list of countries in the chosen continent. And finally, clicking on a country reveals a list of all stations streaming from that country. Talk about easy DXing.

Using the "Favorite" feature, any stations can be stored under the "My Favorites" category. A station is selected by clicking on the "Heart" icon located to the right of the station's "House" icon. It then appears in the list of stations in the My Favorites category.

An excellent on-line manual is displayed by clicking on the Help category.

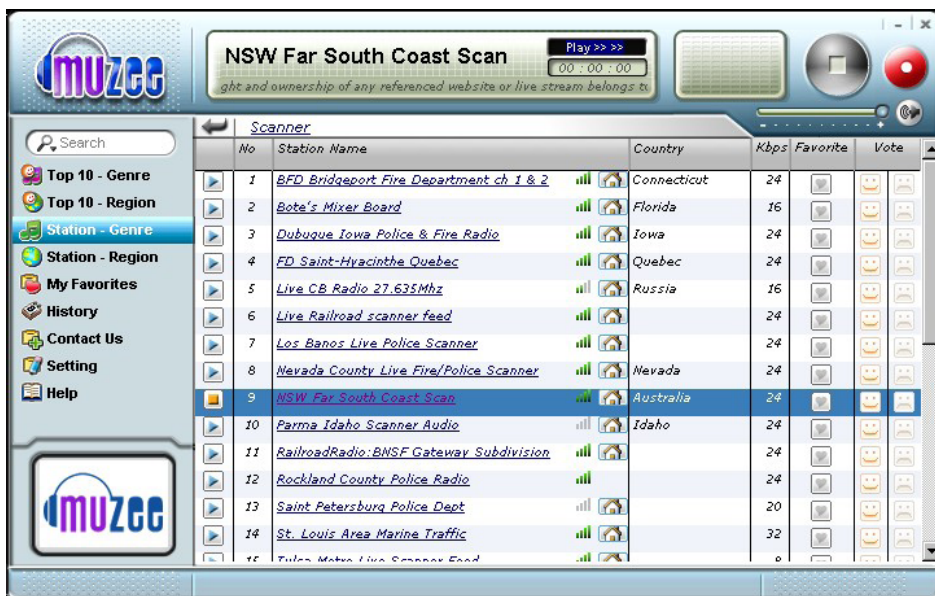


Figure 3 – Here we are listening to scanner audio from an Australian New South Wales site

❖ Recording Audio

To capture the audio of the station we are monitoring, all it takes is a click of the large round (red) button on the top right of the screens. Windows Media Player saves the audio as a “wma” file. Pressing the button a second time stops the recording. Playback of recorded audio files is via the Media Player. See www.muzee.net/mzhelp_en.htm#User for a detailed User Manual and FAQs.

❖ What Do I Think?

The ergonomics of Muzee are excellent. All functions are intuitive and require little, if any, instruction. The product is compact, yet offers ease of use while providing useful functions. Of the stations I accessed, about 90% or more connected and were very “listenable.” All results were very good to excellent...so far.

❖ A Glitch

One station I selected was BBC World Service. But when it did not connect, things went badly wrong, and quickly. At first everything went as expected and I started listening to BBC. Then the streaming suddenly stopped. The moving display at the top of the screen went from “BBC” to “Connecting.” And with this, the Muzee froze and crashed.

The program would not turn off or shut-down! Even bringing up the Task Manager with a three-finger salute (Ctrl-Alt-Del) could not shut Muzee down. After the fourth time “End Task” was pressed, Muzee finally closed. In some cases even this did not remove all remnants of Muzee from the screen. On these occasions right clicking on the minimized Muzee icon did the job.

Once Muzee was restarted, BBC WS was again tried with the same disastrous result. Yet accessing the BBC website directly, via the “House” icon streamed the audio perfectly!

It's strange that other non-connecting stations did not cause Muzee to crash. For these stations the message “Connection Failed” ap-

peared and I was allowed to select a different station without any problems.

Assuming it might be my system, I started by disabling my AVG anti-virus program. But restarting Muzee and trying BBC World Service still caused it to lock up. After restarting the computer, I then disabled my firewall. And still Muzee accessing BBC crashed.

I decided to try Muzee on a different PC running Vista. Everything worked fine, that is, until BBC WS was clicked on, then the same “crashing” results.

❖ Help!

Finally, I clicked “Contact Us” and sent off an email to the company detailing my BBC problems. Twelve hours later I had a reply, which asked for more details. These I supplied immediately.

The next day when I started Muzee and searched for BBC World Service, using the “Search” window above the categories, I noticed

two stations were displayed. One was the original crash-causing site, and the other a new one. The new BBC World Service worked perfectly! I'm pretty sure this was a result of my emails, although I received no further emails from Muzee confirming this.

❖ Auto Updates

Since new sites are constantly appearing on the Internet and web addresses change, the automatic update feature Muzee is very important. I assume updates are loaded each time the program is started. This must be the function of the ActiveX application that automatically loaded during installation. Without regular updates, Muzee's usefulness would become limited very quickly. Let's hope Muzee's business stays healthy so they can keep the updates coming.

One question: If Muzee removes and modifies bad links via updates, why is the “broken” BBC World Service link still on my list? Humm.

❖ Summary

The crashing issue, which occurred for some of the sites that would not connect, is a major problem, especially for a program costing \$50. To be fair, of the 80+ sites I opened, only five sites caused the program to crash. But that's five too many. If you don't select a “crashing” station site, Muzee works great.

Can you listen to stations on the Internet without buying Muzee? Sure. But with features like, region selection, customizable favorites list, audio recording, automatic updates and more, Muzee is worth having.

In my humble opinion, two things should change to allow Muzee to perform to its full potential: no user action should ever make the program crash, and the list price could be reduced a bit. I'm hoping the people at Muzee put in a little more effort and make Muzee a great product. I'll let you know if they do. For what I paid for Muzee, I got a real bargain.

Till next time ... off to the next treasure hunt.



Figure 4 – Selection of stations by continents or “regions.”

What's NEW

Tell them you saw it in Monitoring Times

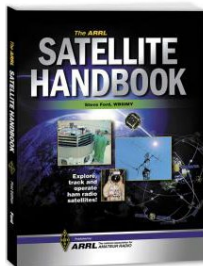
The ARRL Satellite Handbook

The ARRL Satellite Handbook by QST Editor Steve Ford, WB8IMY, brings the thrill of satellite communications within your reach. Filled with understandable descriptions and illustrations, this book includes all the tools you need to participate in this exciting field.

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The contents of this book includes: A brief history of amateur radio satellites, satellite orbits and tracking, satellite communication systems, your satellite ground station, satellite operating, and amateur satellite projects, plus understanding satellite orbits and subsystems by Dr Martin Davidoff, K2UBC.

This book is sure to be a hit with both new and experienced satellite enthusiasts. First edition. © 2008, The American Radio Relay League, Inc. (ISBN: 0-87259-985-X) ARRL Book Number 9857 sells for \$24.95 plus shipping.



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With digital technology becoming an integral part of amateur radio, hams interested in emergency communications now have a new tool to help them take advantage of emerging modes such as Packet Radio APRS, Winlink 2000, IRLP, EchoLink and WIRES-II, D-STAR, APCO25, HF sound card modes and Automatic Link Establishment (ALE). *The ARRL Digital Technology for Emergency Communications Course* will introduce hams to all of the ways amateur radio operators are using digital technology as a valuable emergency communications tool.

Written by ARRL publications manager and QST Editor Steve Ford, WB8IMY, this self-study CD-ROM will answer such questions as:

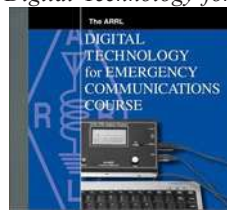
- Can you transfer supply lists or personnel assignments between emergency operations sites?
- Can you get critical e-mails to the Internet if a connection goes down?

- Can you relay digital images of damage at specific locations?
- Can you track the locations of emergency personnel and display them on computer maps?

Illustrations, screenshots, Internet links and audio files are used to demonstrate transmission modes and equipment configurations. Bite-sized learning units and interactive knowledge checks make learning interesting and fun.

"This course is a great starting point for anyone interested in the public service applications of digital communications technology," said Ford. *The ARRL Digital Technology for Emergency Communications Course* is a self-study, CD-ROM, version 1.1 and is available from the ARRL for only \$49.95 plus shipping.

Minimum System Requirements for CD-ROM – Microsoft Windows Vista / XP / 2000 / NT / 98 / 95 or Apple OS X; 200 MHz processor; 32 MB RAM; sound card and speakers; 4-speed CD-ROM drive or higher. Requires Web browser – Microsoft Internet Explorer 6.0, Mozilla Firefox 2.0, Apple Safari 3.0 or later versions. Some documents require the free Adobe Reader software.



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There are many reasons to upgrade your license, including:

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- More communications options – As you access the General frequencies, you now have many more ways to make contacts on new modes and with new groups of hams. Your new skills are also valuable to your emergency team or club.
- New technical opportunities – With your new General class privileges, you now have many more ways of assembling and operating a station. The effects of the ionosphere and solar

conditions will become second nature. Your improved technical understanding of how radio works will make you a more knowledgeable and skilled operator.

- More fun – The traditional activities of ragchewing, DXing and contesting continue to attract hams as they have for decades. You'll find that even familiar activities take on new and interesting aspects on the HF bands.

Not only does upgrading your license grant you more privileges, but your experiences will be much broader. You'll enjoy amateur radio in ways that hams have pioneered and fostered for generations. These new privileges are well worth the effort.

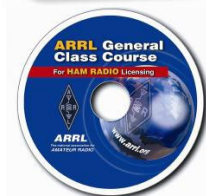
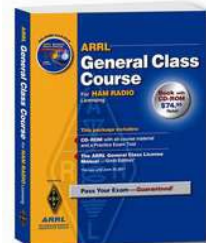
By earning your General class license, you will gain access to nearly all amateur frequencies. Remember: There are no bands on which a General Class licensee can't transmit! As a more experienced ham, your wider knowledge will allow you to experiment with, modify and build equipment and antennas to improve your communications abilities.

The *ARRL General Class Course* includes everything you need to upgrade your ham radio license. Passing your exam is guaranteed! If not completely satisfied, return within 30 days for a prompt, friendly refund.

This course is valid for exams given until June 30, 2011. *ARRL General Class Course*. Book with CD-ROM. © 2008, The American Radio Relay League, Inc. (ISBN: 0-87259-138-7) ARRL book number 1387 is \$74.95 plus shipping.

Minimum System Requirements for CD-ROM – Microsoft Windows Vista / XP / 2000 / NT / 98 / 95 or Apple OS X; 200 MHz processor; 32 MB RAM; sound card and speakers; 4-speed CD-ROM drive or higher. Requires Web browser – Microsoft Internet Explorer 6.0, Mozilla Firefox 2.0, Apple Safari 3.0 or later versions. Some documents require the Adobe Reader software.

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